KEY

TO

MEDICAL SCIENCE.

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INTRODUCTORY PROEM.

In introducing to the public any new science or principle, it has, as a necessary consequence, found both its enemies and opponents, as well as its admirers. Self-interest is known to be a feeling ever at war with truth that would oppose it, and to stop short at no means however low and degrading, the enginery of which is found to promote its particular end. Thus it will be found, that this innate feeling of self—this all-grasping pulse, and self-aggrandizing motive, is one of the great evils with which the truth of every new science has to contend. Those, on the other hand, whose interest it is to believe do so without attempting investigation ; and while they very carefully avoid any opposition at all, are found too indolent to advocate its truth, that thousands who have an *immediate interest* attached to it, may be benefitted to the full extent of its powers.

Every day some new truth is developing itself, and illumining the page of science. The experience of the ancients in Medicine, Arts, Political Economy, and their train of dependents and effective agents, is come, in the present age of enlightened Liberty, to be severely pondered and commented upon ; and though many of the hypotheses, which in the ancient fables were inculcated as the pure light of truth, have developed a principle entirely contrary — still there are many points, both of Medical Jurisprudence and of the lighter arts,

which are admirable in themselves, and beneficial in their operations; whilst others, again, present the strange anomaly of truth and falsehood.

We are labouring under a much stronger chain of superstition now, than the ancients did a thousand years ago. Slavery at that period was compulsory; while that of the present day is voluntary,—that of the ancients being wrought from the strong chain of tyranny and riveted upon them, which they bore proudly after many vain attempts to throw it off; while the slavery of the present age is of a less laudable character—more silk-like in its texture is the chain which binds it, and may be resolved into unrestive subserviency to the powerful. The many false theories which the present state of the world is characterized by, are more ruinous than the fables of the ancients, while they do not answer the same useful purpose. The great body of the reflective and intelligent, emancipate themselves from participation in the production of good which the complete trampling under foot of all hypothetical sciences would tend to produce; yet *they* (calling themselves the lights of science,) feel themselves bound by the dignity of their position, to aid in thwarting the attempts of others in the work of reformation. Challenging truth is not refuting it; and when the centinel in his watch-tower has said "stand" to a determined intruder, although he has done a useful and necessary act, still we may safely conclude that the easiest part of his duty only has been fulfilled. It is this word *stand* used in reference to Medical Reformation, which the legal or *sect-proper* of Physicians persuade themselves is its overthrow, while the flower is still spreading its roots, and sending forth its invigorated germs. Abstract speculation may do well enough for the scholar in his closet; but the many want practical tokens of the benefits of science apart from abstraction. Thus it should be, and doubtless is, that, in a philosophical point of

view, he who produces an ounce of good, has achieved more than he who produces a pound of abstraction.

Reformers, advocates, and the direct partisans of any new principle in the way of Medical Science, have ever had a thorny path before them—while but down alone is fit for the tread of the abstractionist, or he whose theories the people believe because they cannot comprehend. None should embark on the sea of reform, without first counting the cost, in preparing for gales, quicksands, and buried precipices. The ordeal of defamation, ridicule, and approbrium ;

> " The oppressor's wrongs—the proud man's contumely—
> The insolence of office and the spurns,
> That patient merit of the unworthy takes,"—

alike must be surmounted; ay, and the vain aristocrat must also be shown *his* position—the bottom-most round of that ladder to fame his insolent pretensions have taught him to overstep ; he must be shown that Plebeian reason is stronger than Patrician power—and that the first and most important step to human greatness is the establishment of a *vade mecum*, whose operation is to promote the happiness of mankind. He who has vanity enough to proclaim himself a wise man, will rarely be found wanting in pretension, while his whole artillery will be brought to bear against the popularity of another his own narrowness of soul can never win for him. The conflicts which the various reformers in this and ages far past, have had to sustain, are not without their appalling features ; and are well calculated to deter others from venturing before the public eye. This is abundantly illustrated in the case of Columbus, who found many too ready to detract from the merit his discovery of the largest quarter of the Globe full surely entitled him to ; in Luther the first great breaker of the shackles in which priestcraft and Popery had bound the chris-

tian world;—in Gallileo, who first discovered the motion of the earth—in Harvey, Galen, and a thousand others!

Happy, however, is it for us, that, in all these combinations of hostility, amid the blank visages of those whose very sustenance depends upon a state of blind ignorance in the many, and the studied apathy in those whose intelligence and erudition eminently calculate them to oppose and vanquish, the darkness is now somewhat dispelled, and that the sun of thought, the true independency of soul, is up and well on in the ascendant.

In continuing these few remarks which we design to precede our "*Key to Medical Science*" we find it necessary to take notice of but three principles in the character of man, as combining more powerfully to keep back the march of science than any other—and these are:—

1. FEAR.—2. VENERATION.—3. SUPERSTITION.

1st. Fear is a faculty peculiar to all animated beings. There are two kinds, viz: fear in the *conception*, and fear in the *perception*. The latter is influenced by visible objects, while the former is approached by objects in the comprehension, and which are not outwardly visible. With the former of these sensations we have most to do. Fear makes many proselytes; for, in proportion as this sense is worked upon the other functions become inert, and reason herself is said to leave her throne. Fear is never exercised where self is not concerned; though great *solicitude* may be felt for foreign objects, it never amounts to *fear*. It is this *fear in the comprehension* of a power we cannot overthrow, that gives to lawless *force* the greater part of its support:—Great minds, exerted either for good or evil tendencies, drag in their train the sanction, and therefore the support of lesser minds, which are capable of being swerved from the track of their simple tendency. Thus many of the

doctrines of the legal medical school are supported through this fear of which we are treating—this submissive principle of irrational dependence. And here it will be found *self-interest* is not the least in importance. While the minds of men are becoming more enlightened, and the Medical Economy extending itself throughout the modern world, it is somewhat anomalous, that so many individuals of mental strength, and wide reaching erudition—while they so effectually follow the complexities of this *modern wonder of Sciences*—are so far drawn into the shackles of Fear, that they impulsively espouse the most glaring errors, rather than take the field against them and their baneful tendency. Minds not entirely free, and therefore wavering like the magnet just as the distance between it and the stone is circumscribed or lengthened, it is not a source of peculiar wonder that, over-awed by superior intelligence, they take the colour of each stronger object with which they are brought in contact and become passive instruments. The Medical Science of the present age is a great science ; it has powers and attributes without tongue. It has spread itself throughout the land like an undying vine, and its roots have taken hold in every part of the earth. The sanction and support of millions have been given in its favor. Great men of every clime and nation have been drawn by some subtle principle into its support, and it is now teeming in the land of the heathen, where it is to receive still *stronger*, because a much more *blind* support. The question to be settled is, what has Fear had to do with this ? Much—it has been the elbow of the arm that first sat it in motion, and the *coerced* principle of its action. The minds of a thousand may be made subservient to the dictates of one, only in the ratio that genuine liberty, and the power of self-judging of the things that are, are found wanting in their character ; while others are easily swept away by the tide of eloquence and thus qualified to give support to the worst

of principles. Thus *fear in the conception or comprehension*, (with the two other *principles or sensations* which we will shortly come to speak of) has been an important secondary means in establishing most of the odious structures—whether of Governmental policy or Medical jurisprudence—which the world has known. During the age when the old English feudal laws were in successful operation, the tenantry of the Barons formed their chief support. Many, through a love of intestine brawls, but more, and by far the vast majority, were coerced into the measures of the powerful, and therefore rendered a support by no means voluntary—but through the principle of fear, striking at the very foundation of that feeling of self-interest which we have shown to be inseparable from man. But it was not from a *conception* of danger which acted upon them, but from a visible power which threatened no less than the demolition of their hearths and firesides. Fear in the other sense, or that of *conception*, is not quite so laudable, and therefore more cowardly, and the least to be depended upon ; and it is such characters as indulge it, that we have to thank for the permanent basis of many of the odious customs and institutions of the present day. Men having not the boldness to combat an evil, supinely bow their heads till they are crushed between the upper and nether stone which they themselves were conspicuous in raising up. The present intolerable and arbitrary practice of the healing art, is therefore indebted to the supineness of the many for its position, and not to the cool reflection of contemplative minds.

We remarked above, that the present system of Medical Science, as practiced by the mineral advocates, was a great Science. We do not wish to be misunderstood in this. A thing may be great, yet be very far from being good—a man may be a great philanthropist—a great statesman, or he may be a great thief. What we mean is, that medicine, though

it be a great science, is nevertheless daily entailing upon the world an eminent degree of evil, because of its mal-administration.

We come now to speak of Veneration.

2nd. *Veneration*, naturally implies a great liking for the high and powerful. In treating of this subject, we do not wish to be mistaken, as alluding to that laudable sensation we feel in our breasts of the incomparable superiority of the Almighty above all earthly objects:—but to that indescribable something which too often leads men to admire and venerate their own species. And here we have an ample field for speculation. A blind veneration for those above us, either in mental or physical capacity is a characteristic feature in man. He is known to admire his own species, and to delight in the comprehension of it. Man, by his very constitution is susceptible of impression and conviction from something superior, which he finds or is led to suppose that he finds, prominently identified with the character of those with whom he comes in contact. Whether this superiority be of a mental character, or merely an attribute possessed alike by the lower animals, it is the same, so long as a profound feeling of veneration or of awe follows in the mingling of mutual dependence.

A student of the old school of Medicine pre-supposes a veneration for its character, and an entire determination to follow the maxims therein laid down. It is not his business to detect error, or anything which he may discover subversive of the laws of nature. And if it should occur, during the prosecution of his initiatory studies, that he is lucky enough to detect error in the premises—Veneration immediately pops up and teaches him that it is absurd ; that what has once passed the ordeal, and received the sanction of the learned and intelligent, is too far removed out of the pale of probability to be called in question by the proficient and experienced, much less

by the student who has yet to learn the first rudiments of his profession. Let any prominent man or set of men but set the completest nonsense on foot, with all the attendant paraphernalia and machinery, and it will not be long before a thousand of the unthinking will follow in the hue and cry, and complete the solemn foppery—always supposing that its first projectors are men of some notoriety. We are too apt to conclude upon a subject according as its source is eminent or obscure, and to follow the theories of men not for the sake of any truth they may discover, but for the purpose of gratifying that morbid spirit of veneration the human heart is known to possess for high character. Thus, a Channing can produce nothing ill — a Tillotson nothing unworthy of his fame; neither can the obscured individual produce anything worthy of competition with the splendid lights that already blaze in the world of letters. Here is *veneration* to a high degree! but is there also intelligence?—is there *mind?*

Dr. Blair, in his treatise on "Rhetoric and Belles Lettres," in speaking of ambiguity, says, "were any object, suppose some animal, to be presented to me, of whose structure I wanted to form a distinct notion, I would desire all its trappings to be taken off; I would require it to be brought before me by itself and to stand alone, that there might be nothing to distract my attention." This is a proper and apt way of distinguishing between truth and falsehood; but the majority make up their minds with the bare contemplation of the trappings, without deigning to notice the subject beneath. Thus the great and influential minds draw around them the support of the *little* and the *unthinking*. Reason, and the free exercise of mind, are thrown aside, or trodden under foot as unavailable lumber, and the very essence of liberty is scattered over the ground!

The next in importance, and the only principle we deem necessary to adduce in support of our remarks, is *superstition*,

after which we shall class the three together, and thereby discover their effects upon general science.

3d. *Superstition* is a reverence of beings that are not proper objects of reverence; or it may be defined, *implicit reliance in divine interposition.* The last of these definitions may with greater justice be applied to the kind of superstition with which the ancient cities of Greece and Rome were fettered; and this too in their most glorious days, when the arts and sciences, particularly Medicine, were in the greatest perfection among them. The influence of superstition upon the mind of man is two fold. Firstly, its effect as regards his connexion with his species; and secondly, its bearing upon his moral character.

With regard to the first: man, in the simplicity of his primeval state, naturally relied on the interference of some power he could not well define, in the exigencies of life. A too credulous belief in the stories of learned men, who readily passed themselves for the immediate vicegerents of a higher deity, laid the first foundation for the great moral and religious fetters that were forging for him. His conscience readily became innoculated with the virus, and he soon grew in consequence of his conversion to superstition, an oppressor. In this way, its effects were first felt by the whole human race, long before the universal spread of the divine light. Bands of hirelings were scattered to the four corners of the globe, to coerce, and by physical force to restrain the upsoaring of reason. In this way man became the slave of others, and to have no mind--no reason— but such as conformed to the prescribed limits of the more powerful. Superstition, therefore, waxed as reason waned, and the whole habitable earth became its field of operation.

With respect to its moral influence. In the early stages of existence, superstition did not extend itself to all the pursuits

of life, though all were forced into it in one point, viz: religious devotion. It taught, or rather forced men to confess, the moral supremacy of a few of his own species. It taught him to look upon the fanes and mysteries of a set of juggling priests with awe--to confess the part such mysteries had in subjugating the naturally *prying* character of mind, and to ascribe the solemn fooleries of priestcraft to the operation of deities. As the ancients have handed down to us many of their sublime conceptions in the arts and sciences, so, also, have they reserved for us much of their splendid slavery. But the superstition which has descended to us is quite different from that of the ancients. In the various manipulations under which it has gone, its character has become entirely changed, like an article of manufacture, when it has once left the forge of the original artizan, and is attempted to be made more perfect—its whole aspect being reversed, and few of its first lineaments remaining by which it may be known. The superstition of the present day is peculiar. It does not attach itself particularly to religion, but to our institutions and sciences. Medicine has its superstitious followers in an eminent degree ; and the evil effects of this blind confidence, is every day discovering itself—millions of the unfortunate testify to the truth of this ; but however strange it may appear, millions of others are still willing to drag in its toils, and to give to Legal Murder, a pardonable defence. In a word, Fear of the powerful—Veneration of the great—and Superstition, as blind to the very light of reason, have contrived to conjure up a more oppressive evil than the sword of the tyrant or the chains of the oppressor!

In our present treatise, we call upon the reader to exercise that power which the God of nature has vouchsafed to give to every individual—reason, the free exercise of which is well calculated to direct his mind in the high pathway of truth —at least it is best calculated to discover the quicksands of

error. For what purpose was this power granted, but that it should be exercised ; yet do we find those so intent on some favorite pursuit, as almost to abandon it as useless ; content without even the trouble of reflection, to adopt the opinions of another, to "pin their faith upon another man's sleeve ;" and to adopt that opinion which appears the most popular, or that which may have originated with some popular individual.— Thus has it been, that opinions and theories have become fashionable, and thus have they changed according to the prevailing fashion of the times without the least regard to the truth or error capable of being inculcated. Until free inquiry, free and unbiased investigation shall be the prevailing sentiment of the day ; until, divested of all superstition, the human mind is left free to combat error, truth can never become predominant. Perhaps there never was a more correct remark made than the following, by a distinguished author. "He that will not reason, is a knave—He that dares not reason, is a slave—and he that cannot reason, is a fool."

In the above remarks, it will be perceived, that we are not only willing, but invite a thorough investigation of the principles which we advocate. Our doctrines are generally of an original character, the result of long and arduous enquiry, which has resulted in a conviction of their truth.

KEY TO MEDICAL SCIENCE.

Electricity is a subject which has long engaged the minds of philosophers, many of whom have differed very materially in their conclusions respecting it; yet sufficient has been ascertained in regard to it to enable those who are so disposed, to build their structures on practical science, untrammelled by the dogmatical theories and problems of a speculative age. The doctrines involving *positive* and *negative* electricity, or *vitreous* and *resinous*, seem the most prevalent; but that they are most consistent, and most in accordance with plain reason and illustrated facts, wants confirmation. Our conclusions upon this subject, doubtless, by some will be considered erroneous, and by others mere assumption; yet the reader must bear in mind that in the absence of the most positive evidence, conclusions can only be drawn from the consistency and reasonable character of the subject. To foster into existence principles or theories which have no more permanent basis than mere imagination, is the highest order of superstition, and may be productive of the worst of evils both as regards true science and the welfare of community.

Electricity is a principle the most subtile, evading the most indefatigable and unwearied research. Electricity we consider the first, the all-powerful principle emanating from the Cre-

ator,—the power by which all things were made,—the grand *fiat* of Nature,—the source of vitality itself! From electricity come heat, light, affinity, attraction, galvanism, magnetism, &c. And it is by this power that all motion is produced; by which all matter is formed; by which composition and decomposition continually take place; and by which, eventually, the dissolution of all things will be completed.

Considering this to be the true ground of philosophy, we venture upon this important subject, not with the expectation of being able to overthrow long established prejudices, but to illustrate simple truth; to place the subject of Electricity before the public mind in that true light which an honest conviction of its importance demands.

The properties which certain bodies acquire by friction are peculiar: for instance, by rubbing a piece of sealing wax, or a glass tube with a woollen cloth, then bringing into its neighborhood small fragments of paper, or down of feathers, these minute bodies will be attracted by it, and adhere for some time to its surface, and then be repelled. This property was observed by the ancients to exist in several substances, particularly in *amber*, from which the Greeks derived its name—"*electricity*."

Stephen Gray, of the Royal Society of London, in 1720, it appears, commenced the first electrical experiments, by which he found certain substances capable of being excited by friction, which he called *electrics;* those which were not, he called *non-electrics.* Those bodies which became *electric* by being placed in the neighborhood of an excited body he called *conductors;* those which were not, he called *non-conductors.* The *electrics* he found were all *non-conductors;* and the *non-electrics* were all *conductors.* We here perceive the very first instance of the supposition of two distinct and opposite principles, negative and positive electricity. But the theory of two distinct "*elec-*

tric fluids" was introduced more especially by Dufay and Symner, in 1734, which Dufay distinguished by the terms *vitreous* and *resinous electricity*, but which is founded entirely upon assumption. In order to account for electric phenomena, they assume the two fluids to be possessed of the same power and properties, and capable of neutralizing each other ; and electrical excitement the consequence of one or the other being in excess ; and that their combination may be destroyed by friction.

These opinions prevailed until our distinguished fellow citizen, Dr. Benjamin Franklin, the American philosopher, introduced a different theory : that electricity itself was but a *simple element.* Yet writers consider his conclusions but assumption ; although his investigations upon the subject were far more laborious and extensive than those of any other philosopher.— Who other than him ever dared by a single wire to attract from the clouds of Heaven the electric fluid, and charge with it a glass jar, by which means he ascertained that it was the same in character as that generated by an electric machine. The experiment in itself was boldly conceived, and the attempt hazardous.

The doctrines of Franklin attracted the universal attention of philosophers ; and the science was cultivated with assiduity until Volta was led to invent the "*Voltaic Pile*" in consequence of discovering that conductors, when brought into contact, acquire different electric states. Then were again revived the old opinions of Dufay, or "*positive and negative electricity.*" The opinions of Franklin were supported and reverenced by some of the most scientific men, among whom were Cavendish and Epinas ; but it is a fact somewhat remarkable that foreign influence is invariably exerted to its utmost extent to detract and bring into contempt any new acquisition or science which may originate in the intellectual mind of a citizen of the New

World. That the theory, doctrines and views respecting electricity introduced by Franklin are generally correct, we have little doubt. When we take a general view of the whole ground aided by reflection, reason and common sense, we irresistibly arrive at such conclusions; and where, in some instances, a mere inefficient experiment may seem to favour a contrary opinion, it only illustrates our incapacity to arrive at the various peculiarities attendant on this most subtile and invisible agent of the Deity. We would only ask, can it be possible that there are two contending elementary principles in Nature, precisely of the same character; producing the same effect; of the same power; emanating from the same source, and capable of neutralizing each other? If so, must not their agency be rendered of no importance in nature, and utterly useless, especially when we consider (as we shall directly illustrate, and as we have before said) that to this power, and to this power alone, belong the great principle and cause of the formation of all matter by attraction?

The term "*minus* and *plus*" adopted by Franklin appears to exhibit the true principle, and corroborates the fact, that a body charged with electricity is attracted by a body less charged with the electric fluid: in other words, that electricity like all other fluids seeks its equilibrium. If I charge with the electric fluid the ball of an electric machine and place my hand near, it passes from the ball to my hand. Does not this illustrate still the same fact, that a body charged with the electric fluid seeks its equilibrium by passing to a body which is less charged? It may be well however to remark that what Dufay called his *vitreous* electricity, Franklin termed *positive* or *plus*; and the resinous electricity of Dufay he called *negative* or *minus*.

Electricity is a principle which pervades all nature, all space; there is no place where it is not: it is that bright circumambient flame surrounding the sun which renders that planet one eternal

day—it is that lucent flame which we call the aurora borealis. It is that power by which all motion is produced, both in animate and inanimate substances—it is the source of caloric—it is that power by which the whole planetary system revolve in their respective orbits—in a word it is the power of the Almighty.

Affinity and attraction are principles which the philosophical world has long laboured to define, but the result of its research is (as is frankly admitted) that it is a subject not comprehended or understood. Sir Isaac Newton considered planetary attraction the same as gravitation. Philosophers have contended for various species of attraction: as electric attraction, chemical attraction, attraction of gravitation, or terrestrial attraction, cohesive attraction &c. Dr. Hooper, in his Medical Dictionary, says. "The nature of this reciprocal attraction, or at least the cause which produces it, is altogether unknown to us. Whether it be inherent in all matter, or whether it be the consequence of some other agent, are questions beyond the reach of human understanding; but its existence is nevertheless certain." Thus do authors admit that they know of its existence; but how or why it exists they acknowledge their utter ignorance of—"whether it be inherent in all matter, or whether it be the consequence of some other agent" they say are questions "beyond the reach of human understanding." How strange it is that scientific men should be so confident, that they have so fully investigated the Laws of Nature to the utmost limits as to determine that no enquiry, however laborious, could be extended beyond their researches! and with a single thrust attempt to close the door to all future investigation by declaring it to be "beyond the reach of human understanding." Yet such is but too frequently the pride, the the folly, the vanity of human nature! Thus have philosophers apparently ever been enveloped in the dark mist of imagination, without any further guide in their desultations than

fictitious reasoning based upon abstruse and imperfect experiments. That affinity and attraction are both the result of electricity, must be perfectly evident to every mind that has reflected in the smallest degree upon observation. That there should be various causes of attraction inherent in themselves, apart from electricity, is absurd ; and especially the more so, when all writers agree that attraction universally pervades all nature. That electricity pervades all matter, and that matter is the only vehicle for the conveyance of electricity, is most evident. That the positive is attracted to the negative, all admit ; we admit the same if it be meant its deficiency or superabundance, but not two specific electrical fluids. The sulphurous or phosphoric smell, sub-acid taste, &c., which have been thought a property of electricity, arise, not from electricity, but from its action upon certain aerial fluids, as will be shown hereafter. Electricity is an independent aerial fluid ; a simple substance uncombined with any other, but charging and acting upon all aerial fluids, and all matter more or less according to its susceptibility of its influence ; and when thus uniting or charging such elementary fluid, or ponderable matter becoming charged with it, it immediately is attracted to that body which possesses electricity in a less degree. The facility with which a body charged with electricity unites with a body less charged with it, is in proportion to the quantity of the electric fluid with which the positively electrified body is charged ; in consequence of which it sometimes acts slowly, and almost or quite imperceptibly ; and at other times the most violent. Then is it that electricity produces motion by affinity and attraction. We here perceive the grand princples by which planets revolve in their orbits around the sun, which is termed the grand centre of motion and the grand focus of this electrical power, placed by the Creator in the firmament for this great purpose ; and hence, we perceive the cause and reason of every other

motion and power, from the rushing of the tornado which desolates the forest or sweeps over the deep, down even to the nerve, muscle &c. by which we perform a single act; or by which the most insignificant insect crawls. It is owing to the rapidity with which this motion is performed that heat is generated by friction upon the elementary principles of matter, or matter itself resulting in combustion and light.

Terrestrial attraction, or attraction of gravitation, upon reflection, cannot but be comprehended. The earth all philosophers admit to be negatively electrified: according to our theory it possesses a less degree of electricity than is contained in the atmosphere which surrounds it; consequently, upon their own principles, the attraction by electricity must necessarily be towards the earth.

Another cause in explanation of terrestrial attraction would be the impetus produced in a body possessed of ponderosity towards the earth by the earth's rapid motion upon its axes, revolving at the rate of over 1000 miles per hour, and in its orbit over 24.000 miles per hour. Such tremendous velocity must necessarily create an atmosphere of considerable extent; philosophers compute it at about 45 miles: and hence, all ponderable bodies as well as imponderable substances must necessarily gravitate to the centre; it could not be otherwise. This velocity of the earth must likewise, be continually inducing into the limits of its atmosphere in consequence of the swiftness with which it revolves, the various gases or the elementary principles of matter from space, and be hurried by the atmosphere to its vortex, or to the earth; and the nearer it approached the greater would be the facility with which it would continue to approach, in consequence of the weight and pressure by the accession and constant accumulation from space.

Electricity travels with a facility of which we have but little conception: some idea is furnished our minds by discerning in

what an instant of time a flash of lightning is conveyed from one quarter of the heavens to another: and likewise by means of conductors. A person receiving a shock from a machine holding a wire or conductor in his hand, which wire may be ten or twenty miles long, and different individuals placed at various sections along the wire clear to the extremity, so rapid will be the velocity with which it travels that the individual placed at the farthest extremity, as well as those in the intervening space, will feel the shock nearly in the same instant of time, so much so, that no distinction can be remarked.

To show that electricity is not in itself fire, but that by its rapid action it is capable of producing combustion, the simple experiment of charging an incombustible body or substance with this fluid most fully illustrates. Let the human body be placed upon an insolated stool and charged with the electric fluid, and when under such influence sparks of fire may be emitted from all parts of his body, and if he then place his finger in alcohol it will be set on fire, or in powder it will explode. These facts furnish the most satisfactory evidence that the fire was not in the electrical fluid itself, and that it was its coming in contact with a combustible body which produced combustion, which would be more or less violent just in proportion to the facility with which the fluid was attracted; and consequent decomposition was effected: if it were fire, or electric fire as it is called, the body charged with the fluid would be consumed; as evidence is not wanting of the very extensive heat capable of being produced by the action of electricity on atmospheric fluids; so great has it been, as even to melt the hardest metals instantaneously.

If light, heat or electricity were matter, would it not be possessed of weight; instead of which, they have been found to be altogether destitute of it, and cannot be discovered by the most delicate balance. Atmospheric air can be weighed;

consequently we have the evidence at once of the existence of material substance, or the elements of mattter. Its weight has been determined with considerable precision by Dr. Prout which shows that 100 cubic inches of dry atmospheric air at 60° F. weigh 31.0117 grains.

How far electricity may be concerned in creating or bringing into existence the various elementary principles of matter, as oxygen, hydrogen, phosphorus, carbonic acid, &c., or whether they of themselves are simple or compound substances, future illustrations may yet develope.

Light the result of the action of electricity, is not the facility with which it travels inconceivable? Astronomical observations have shown it to be at the rate of 195.000 miles in one second, and it requires but about eight minutes to pass from the sun to our earth, a distance of 95 millions of miles.

Our next object will be to examine the gases contained in the atmosphere; and generally, as far as have been discovered, give their properties and uses. We contend, and think that we shall be able to prove, that the gases of the atmosphere are the elementary principles of matter; and from those gases all matter is formed by the power and with the aid of electricity. Philosophers have considered all gases of the atmosphere as matter; from them in this particular, we beg leave to differ, and shall consider *that* as matter which assumes some tangible shape or form: that which is gaseous, we shall consider as elementary, and not matter until it assumes an organized state by combination with other gases.

The atmosphere in which we live is comprised of two distinct aerial and elastic fluids, which surround the earth to an unknown height, enclosing it on all sides; the effect of which we are sensible, but they are imperceptible to our vision. It was considered as one of the four elements of Aristotel. The ancient philosophers considered it the constituent principles of

other bodies; but it remained a matter of conjecture until explained by Hale and subsequent philosophers. It was not until the time of Bacon, who first taught the system of investigating *natural phenomena*, that the subject was examined with precision. Galileo first examined its weight, which was afterwards fully investigated by Torricelli, Paschal and others. Its density, elasticity, dilatability; its relation to light, sound and electricity; the effect produced upon it by moisture, &c., have subsequently been pointed out by various other philosophers. It was Boyle and his contemporaries who first put it beyond doubt that the atmosphere contained two distinct substances; an elastic fluid, and water in a state of vapour. It was likewise supposed to contain a variety of other substances which were continually mixing with it from the earth, frequently altering its properties and rendering it noxious and fatal. Carbonic acid gas, discovered by Dr. Black, always comprises a part of it.

For many ages all gases were considered as air, from whatever substances they were extracted; and supposed the same as the air of the atmosphere. Van Helmont, however, suspected that gases possessed different properties, and Boyle ascertained that all of them were not capable of supporting combustion. It was not until the discoveries made by Cavendish and Priestly, which demonstrated their different and peculiar properties, that philosophers were made sensible of their various species; after which, the word *air* was applied by Priestly and the British and Sweedish philosophers, to all permanently elastic fluids, while the gases comprising the atmosphere were termed *common*, or atmospheric air; but Macquer, however, thought proper to apply the term gas to all elastic fluids, and to confine the term *air* to the atmosphere *alone*, which has since been generally adopted. That a great variety of gases of which we have at present but little conception, exists in atmospheric

air, there can be no doubt, which will be more fully understood in the course of this work.

Atmospheric air for a long time was considered a simple substance; and it was not until about the year 1774, when Dr. Priestly discovered oxygen gas, that it was found to be a compound of two distinct gases. It is to the labours of those philosophers, in whose hands chemistry advanced with such rapidity, during the last forty years of the 18th century, that we are indebted for the discovery of its constituents. While Dr. Priestly was engaged in his experiments upon oxygen, an analysis of common air was made by Scheele, who from his experiments concluded that it was a compound of two different elastic fluids: namely, *foul air*, which constitutes more than two-thirds of the whole; and *another air*, which is *alone* capable of supporting flame and animal life. The foul air is that which is now called *nitrogen*, or *azotic gas;* and the other that which is at present termed *oxygen gas.* According to Scheele, atmospheric air is a compound of two parts azotic, and one part of oxygen gas. While Scheele was occupied with his experiments on air, Lavoisier was assiduously employed on the same subject, and was led by a different road to precisely the same conclusion. From a variety of experiments, he determined the properties to be 73 parts of azotic gas, and 27 of oxygen. After the composition of atmospheric air became known, it was not doubted that the proportions of its oxygen varied at different times and places; and that upon this variation depended the purity or noxous qualities of air; yet all the different experiments that have been made, agree precisely in their results, and indicate that the proportions of the ingredients of air are always the same: philosophers have found no variation in Egypt, France, Edinburgh, London or America, at any season of the year, or at any height. Gay-Lussac examined air

brought from the height of 21.000 feet above Paris, and found it precisely the same.

From the preceding remarks, we perceive the constituents of atmospheric air, which science may yet still further develope and illustrate, that both nitrogen and oxygen gases are not simple but compound substances. That we have attained perfection in our philosophical investigations cannot be admitted by those who are conversant with the subject. Other gases or aerial fluids exist in the atmosphere, and no doubt are very numerous. Thirty-four of the gases have been examined, of which all but five are known to be compounds; they are not necessarily constituents of the atmosphere, yet they are constantly charging and mixing with it in various proportions, the superabundance or deficiency of which may become deleterious to both vegetable and animal life—especially those gases generated from low or marshy countries.

That water is contained in the atmosphere has always been known. Rain, dew, clouds and fogs, which deposite moisture on all bodies exposed to them have demonstrated its existence in every age. Even when the atmosphere is perfectly transparent, water may be extracted from it by various substances; in general, all deliquescent salts possess the property of extracting it. Water is a compound of oxygen and hydrogen gas. Mr. Cavendish is considered as the real discoverer of the composition of water. Hydrogen gas, like air, is invisible and elastic. It is the lightest gaseous body known, therefore best adapted to inflating balloons; all burning substances are immediately extinguished when plunged into it; animals, when obliged to breathe it, soon die. Forty-two measures of pure hydrogen, and twenty-one of oxygen, fired by an electric spark form water: thus it is, that rain falls with more rapidity or in greater abundance, immediately after a flash of lightning.—Hydrogen gas was formerly called inflammable air, and may

be procured in abundance by causing a stream of water to pass through a red hot iron tube, or by decomposing water by means of sulphuric acid and iron filings.

The fact that *carbonic acid* gas exists in the atmosphere, was first discovered by Dr. Black. It had long been known that alkalies exposed to the atmosphere were gradually converted into a carbonate. It not only unites with alkalies, but with some of the earths, and several of the metalic oxides; thus *rust* is always saturated with carbonic acid. It exists in the atmosphere, not only near the surface of the earth, but at the greatest height which the industry of man has been able to reach. Saussure found it at the top of Mount Blanc, 15668 feet above the level of the sea, the highest part of the European continent, which is covered with eternal snow. Humbold found it in air brought from a height of 4280 feet above Paris. The quantity of carbonic acid gas contained in the atmosphere has not yet been fully ascertained; but we may conclude from the experiments of Mr. Dalton, that it does not much exceed the one thousandth part; but it is however liable to great variation from different circumstances, and is constantly mixing with the atmosphere; it being produced from the respiration of animals, by combustion, fermentation, decomposition of both animal and vegetable substances, and several other processes: indeed, the quantity produced from various sources is so great, that it would appear somewhat astonishing that its increase should not prove fatal; as air, containing but a small proportion of it extinguishes light, and is noxious to animals and man; were it not that this gas is absorbed in abundance, and as rapidly as it is formed, by vegetation, its effects would be most disastrous to human life. Carbonic acid is a compound of carbon and oxygen, and may be produced by burning charcoal in the air, but as shown, exists in abundance in the atmosphere.

Oxygen, hydrogen, nitrogen and carbonic acid gas, general-

ly speaking, form the principal constituents of all vegetable matter, by their uniting in various proportions with each other, of which there are upwards of 30.000 different species now known. Carbon exists in the atmosphere combined with oxygen, which, by their union, form carbonic acid gas. All plants possess the power of absorbing this gas, and applying it to their support and nourishment by decomposing it and retaining the carbon and expelling the oxygen: hence it is that plants are said to absorb carbon and throw off oxygen. Phosphorus likewise exists in the atmosphere, which by the action of electricity, is constantly undergoing combustion, thus forming with oxygen phosphoric acid, which is that principle which has led philosophers to suppose electricity possessed of a sub-acid taste; it is absorbed by plants and animals; in animals, it unites with lime and forms the bones, and is also a general constituent of all the animal fluids. To form any particular plant, or a constituent of it, those gases always unite in relative proportions according to the affinity which they possess: they could not unite in any other way! And could they, the product would be far other than the particular plant or article contemplated. The laws of Nature, are always uniform and unalterable. Carbon, hydrogen and oxygen form alcohol, æther, spirits of turpentine, naptha, oil of capava, juniper oil, black pepper oil, sugar, starch, resin, gum, &c. Gluten in its composition, evinces the presence of the whole four. In fact, every plant and tree which we behold, are constituted of these elements, and are formed directly from them; but their proportions necessarily vary in every specific vegetable production.

When these elements form substances, we consider such substances as matter; which matter possessing still the same principle of attraction, being still governed by electricity, unites with other formations of matter, and progresses onward,

still forming new and different combinations of matter ; and in many instances, disengaging some one of its original constituents, and forming entire new compounds: thus it is that sulphuric acid will decompose muriate of soda, or common salt, and unite with its base the soda, and form sulphate of soda, or Glauber salts, and at the same time set free the muriatic acid with which the soda was combined. The various acids will unite in relative proportions with the alkalies, forming salts of various descriptions, frequently double and tripple compounds : sometimes uniting in one proportion, and sometimes in two.— Metals by oxadizement, unite with acids, and form metalic salts : the earths possess similar powers. But it may be asked—do not vegetables contain salts of various kinds, earths, metals, &c.? Suppose they do! Are not the elementary principles of earths, alkalies, metals, &c., constituents of the atmosphere? How are potash and lime (which are discovered in all plants by incineration) formed but by the power which the plant possesses to absorb from the atmosphere the particular constituents requisite for its formation? Metals are produced by combustion, or by the action of heat on certain compounds, and may be considered as the last grade of matter.— They contain no oxygen. Had we no other illustrations on this subject than the experiments made by Sir Humphrey Davy on potash, soda, lime and magnesia, it would be sufficiently conclusive. He submitted those articles to the strongest action of heat that he was capable of applying by the power of a galvanic battery ; by depriving those substances of a large portion of the oxygen they contained, they then exhibited all the character of metals, as potassium, sodium, calcium, and magnesium: and hence it is, that those articles so readily unite with acids, whilst metals themselves require to be oxadized. We have said that metals were produced by combustion : not only are *they* produced by combustion, but the earths

likewise : even the solid layers of rock which we find in almost every section of the world, show their formation to have been by fire, the result of volcanic action—indeed, our whole planet exhibits the appearance of having been frequently subjected to volcanic eruptions. When those subterraneous fires, that are continually rolling through the bowels of the earth, acquire from those materials in the earth (possessed of sufficient combustible power) strength capable of producing general explosion, the lava is thrown out therefrom, and on cooling, forms those rocky eminences we so generally witness. The present Volcanoes, as Vesuvius, Etna, &c., are no other than chimnies, for those subterraneous fires. By this same principle do we contend that metals are formed ; and hence, we find metals generally combined with other substances in the earth, from which they require purification before they can be rendered of utility. And hence is likewise shown the inability in us fully to illustrate the chemical analysis of metals, in consequence of the extreme heat which we must necessarily require to accomplish such analysis. The powers of Nature are far beyond that of art—art is at best but a faint imitation of nature. To deny to nature the power to accomplish that which the imbecility of art had failed to achieve, would be to place them upon an equality ! It would be nothing short of presumption, folly and ignorance. Nature has power not only thus to form metals, earths, &c., but has likewise the power to form them directly from the elementary principles existing in the atmosphere, by the unlimited power of electricity, which is capable of so acting upon the combustible materials of the atmosphere, as to create a degree of heat beyond the conception of man. What are meteoric stones but the result of this action ? Certainly the fabulous idea that they were thrown from the moon, or some other planet, has long since exploded. Those luminous bodies called meteors, have in all ages been

observed in the atmosphere, many of which have been described by eye-witnesses. The most remarkable one on record is that which appeared in 1783 ; it was very luminous, and its diameter, it was supposed, could not be less than 1000 yards. It traversed England and a great portion of the European continent with very great velocity, at the height of nearly 60 miles from the surface of the earth. These meteors move in a direction nearly horizontal, and seem to approach nearer the earth before explosion takes place, which is generally attended with a loud report, when a shower of stones fall. Numerous respectable authors have furnished the most conclusive testimony of their falling in various parts of the world. Not only have meteoric stones fallen, but iron, mercury, sand, sulphur, &c., in all parts of the world, as the following statement will illustrate, in which I not only give the names of the persons reporting them, but the time and place. Livy reports that a shower of stones fell at Rome during the time of Tullus Hostilius. Another shower of stones fell at Rome during the time of Consuls C. Martins, and M. Torquatus, reported by J. Obsequens. A shower of iron fell in Lucania the year before the defeat of Crassus, reported by Pliny. A shower of mercury fell in Italy, reported by Dion. Three large stones fell in France, 452 years B. C. reported by Ch. of Count Marcellin. A large stone of 260 lbs. fell at Ensishiem, Upper Rhine, Nov. 7th, 1492, reported by Butenschoen.—About 1200 stones—one of 120, and another of 60 lbs.—fell near Padua, in Italy, in 1510, reported by Carden Varcit. A shower of sand, for fifteen hours, fell in the Atlantic, April 6th, 1719, reported by Pere La Feuillee. Sulphurous rain fell in the Duchy of Mansfield, in 1658, reported by Spaugenberg. A shower of sulphur fell at Brunswick, October, 1721, reported by Siegesber. A stone, weighing 56lbs. fell at Wold Cottage, Yorkshire, December 15th, 1795, reported by Capt. Topham.

A mass of iron, containing 70 cubic feet, fell in America, April 5th, 1800, published in the Philosophical Magazine. Another mass of iron fell, 14 quintals at Abakauk, Siberia, reported by Pallas, Chladni, and others. Two large stones, one of 200, and another of 300 lbs., fell near Verona in 1762, reported by Acad. de Bourd. Numerous instances similar to the above, might be given ; but those which are here set forth are deemed sufficient to establish the point in question. Those stoney bodies, when they fall, are always *hot*, and differ from a few ounces to several tons, of a roundish form, and covered with a black crust composed chiefly of oxide of iron and nickle ; and in many cases smell strongly of sulphur.

In the foregoing illustrations we think we have conclusively shown, that the elementary principles of all matter exist in the atmosphere ; and that matter or ponderable substances are formed from them by the power of electricity. Some proportions of the constituents of matter, and matter itself, from their very nature being capable of becoming much higher charged with the electrical fluid than others, become attracted towards those substances or gases which are in a less degree charged with it, and with which the former may be placed more directly in contact. The objection may here be raised, that there are many ponderable substances which in themselves are simple, as metals, earths &c. Our opponents would say that it may be possible that a great portion of vegetation may in a considerable degree owe its accumulations to the absorption of certain gases from the atmosphere, but cannot apply to those metals and earths considered simple substances : To such we reply that it requires a far different process in nature to produce and bring into existence metals, earths &c. from the elementary constituents of the atmosphere, than the simple and mild process by which vegetation is produced. Are not all metals capable of oxadizement and decomposition ?

Vegetation is the first order, or first grade of matter, formed directly from the elements pervading the atmosphere. We perceive that the earth produces various species of vegetation: but how, and why it does so, many eminent men have deemed it among the things impossible to comprehend. Could such results take place independent of the Laws of Nature? What other laws could be brought into action? None! Yet have many who have been accounted as distinguished writers on these subjects, been led far from the truth, into the most superstitious and imaginary ideas: not being sufficiently informed on the true principles and laws of Nature, they have supposed it of so mysterious and indefinable a character, as to be compelled to imagine and create an indefinable and incomprehensible principle, to assist them to illustrate natural phenomena. Instead of honestly admitting their incapacity for investigating the *laws* of *Nature*, their pride and arrogance have led them to assume a perfect knowledge of *all* nature's laws; and by the invention of a superstitious principle called *vital principle*, or *vis medicatrix naturæ;* they attempt to blind the world, and lead their followers into the same error; and thus, attempt to hide their own unpardonable ignorance. The world has groaned under this error for centuries, and its effect has been to retard, to obstruct the march, yea almost paralyze true science—it has served to prevent those investigations and researches in science, that otherwise, ere this time, would have developed the *principles of life* and the organization of all matter: but by referring it to a power—a superstitious imagination—a principle, incognizable and incomprehensible; which its authors have alleged, was neither material nor immaterial, served to confirm the opinion, that no research however arduous, could extend beyond their contracted and illiberal views.

If vegetable substances do not derive their support, properties, &c., from the atmosphere, may we be permitted to ask

then, from whence they come? Will it be contended that they derive it from the ground, from the soil? Was not the soil formed from the decomposition of vegetable matter? Will plants ordinarily come to perfection without vegetable mold? The soil forms a bed for their roots, by which they are protected from heat and cold, and are thus preserved from injury. The capability of the ground for retaining moisture, enables the small fibres of the plants to absorb moisture from the earth; and as vegetable soil contains a large proportion of carbon, which is in a great measure the food of all plants, portions of carbon uniting with oxygen may be taken up: further than this (although this is essential) plants derive very little advantage from the soil. Plant the acorn, the product of the oak, and in a few months we behold it a small twig; years pass on, and we behold it a great and mighty tree, comprising several cords of wood. From whence did this tree acquire all the constituents of which it is composed? Did it derive them from the earth? If we subject it to decomposition by fire, we find a very great proportion carried into the atmosphere; and even the residium comprises scarcely any, if any, of the constituents of the ground in which it grew: the residue comprises potash.—Hence, it becomes evident that potash is formed by combustion of certain woods. But from whence did the tree acquire the substances of which it was possessed? Simply, the original germ, the acorn, from the warmth and moisture of the earth acquired the power to expand and put forth its powers of germination; and subsequently, to absorb from the atmosphere the particular gases necessary for its growth and support, and eventually to render it what it was. To assert that the earth furnished it the necessary support would be folly! If it were so, why are not all plants of the same character? How do plants growing in the same soil possess different qualities and properties? The circumstance cannot be accounted for upon such

principles. Take, for instance, a grain of wheat : plant it, and directly along side of it, and within four inches place the seed of one of the most poisonous plants, *henbane*, for instance : they are both raised from a small seed ; they grow in the same ground, and are subjected to the same moisture, the same temperature, and to the same atmosphere : they both arrive at maturity, and their increase is probably an hundred fold ; they are in every respect subjected to the same circumstance ; yet we find the properties of each plant as widely different as we can imagine ; one is capable and necessary for the support and maintenance of human life, whilst the other will destroy it. Why is it so? From whence did each of those plants, so widely different in character, acquire the constituents of which they were possessed? Certainly not from the ground. If that were the case, their character would have been the same. From whence, then ? The original germ, each individual seed possessed the power of attracting from the atmosphere the particular gases which exist in it, in the requisite proportion to form the particular plant which, by their union and combination, are capable of rendering each what it is. All matter, and all formations of matter, are governed by the laws of Nature and no other, which laws are perfectly comprehensive.

Vegetable matter appears ordinarily to be the first process of nature to form matter from the elementary principles of the atmosphere ; which elementary principle pervades all space : hence the accumulations constantly forming upon the earth's surface, in the shape of what is termed vegetable mold, resulting from the decomposition of vegetable matter, which is constantly taking place upon the earth's surface ; and which likewise forms an indispensible auxiliary for the growth and support of vegetation. Then is it evident that the earth is increasing in magnitude and ponderosity. Much evidence may be produced in support of this position. He who has

ever visited our large western prairies cannot but have witnessed their depths of vegetable mold, extending frequently 6, 8 and 10 feet below the earth's surface. Witness our marshes and flatlands from which pete is extracted. Let but a small proportion of land be deprived of its vegetable mold, and there appear nothing but sand and gravel; yet in a few years we perceive more or less vegetation upon it, and considerable vegetable mold. Vegetation may be considered as the first order or grade, of what is termed living matter; and vegetable mold the first order or grade of what is termed dead matter: yet there is no form of matter which is inert.

The study of Geology has furnished us with much important data in respect to the nature of the formation of earths, metals, &c. We have before stated that those substances are produced by combustion. Geology furnishes many facts from which we may draw the most satisfactory conclusions that the whole earth, the planet on which we dwell, has often been subjected to volcanic eruptions.

When we reflect upon the uneven surface of the earth, its deep chasms and valleys, its towering mountains and cliffs; extending to such immense heights, when we discern from their summits the clouds and contending elements beneath our feet, we cannot but consider them the result of some awful convulsion of nature, by which immense masses have thus been piled together. The circumstance of marine shells in large quantities having been discovered hundreds of miles from the sea at great depths in the earth, as well as logs of timber &c. which are sometimes deeply imbeded in mines of clay or marl, all go conclusively to prove the earth to have undergone very extensive transformations at various periods of time; and there is likewise much evidence that could be adduced, which would go to show that the earth has formerly been extensively peopled and that by some such universal convulsion of nature, nearly

all the inhabitants of the earth had been destroyed. Numerous masses of rocks, rocky mountains, stones, &c., plainly shew their formation to have been by heat, which in some instances must have been immense, as in the production of granite. Others, again, appear to have been produced by the cooling of liquid lava, throughout which numerous small pebbles and sand are abundantly diffused. Such formations appear to be a heterogeneous mass, many of them comprising a variety of compounds of metals, earths, &c. sometimes in layers, veins or spots, according to the intensity of the existing heat. Even our large beds of anthracite coal, as well as bituminous coal, are the formations of this smothered flame in the confines of the earth. In this way are the various metals, earths and fixed alkalies produced: metals being the last or ultimate grade of matter. Yet as before admitted, the elementary constituents of metals, and all matter, exist in the atmosphere, and are produced therefrom by combustion upon the same principle. Plants imbibe from the atmosphere these elementary principles, but they are not developed or formed until subjected to combustion, as witnessed in the production of potash, lime, &c. It is not to be considered strange that subterraneous fires, capable of producing volcanic eruptions, should exist. It would be the natural consequence of certain bodies coming in contact in the bowels of the earth—they always do exist to a greater or less extent.

In the foregoing remarks, we think we have proved by existing facts and justifiable reasoning, that the constituents of all matter exist in space, and that they are constantly passing into the sphere of this planet; which by electrical action, are formed into matter; under which they undergo a variety of changes and forms. That all matter may be decomposed and returned to its original elements, is fully possible; there *can be* no doubt of it. This earth may "pass away with a great

noise." But this effect must be accomplished by heat. The degree of heat necessary to produce this result, it is impossible to tell. The fact, that astronomers have discovered that some planets which once did exist, have since disappeared, evinces not only the possibility but probability of this result.

The existence of matter depends likewise on temperature, which, when too high or too low, vegetable and living matter are incapable of formation. When too high, all matter becomes decomposed, and resolved into its original elementary principles. Neither vegetation nor animal life can exist where there is intense cold, or the extreme absence of caloric. A certain degree of temperature between the two extremes, is absolutely necessary for the existence of every description of living matter ; yet, the lowest degree of temperature will not destroy what is termed dead matter. At a certain temperature, water is solid, at a higher it is fluid, at a still higher it is evolved in steam, and at a still higher, it becomes decomposed and returned to its original elementary principles, oxygen and hydrogen. So is it with every other substance : all matter, as alumina, lime, iron, silver, gold, platina, &c., and every description of matter comprising the constituents of our planet. By heat our whole planet, and every constituent of it, may be decomposed and returned to their original elements ; and, uniting and assimilating with like elementary principles in space, be diffused through all space, or again enter into new combinations to form other planets. We consider that we have likewise illustrated the principles or causes of geological layers or strata of the earth, as shown by Geologists, in our illustrations of the accumulations or accessions which the earth is constantly receiving by the deposits from the atmosphere. That the earth is becoming more dense in the centre is equally evident, and may, as its poles become perpendicular to the line of the equator, occasion in a greater or less degree, the most extensive

volcanic commotions, characterized by all the catastrophes which an event of this nature would be likely to produce.

Having given our views of the origin and formation of matter by electricity from the gases, or elementary principles which pervade the atmosphere, and all space—our next object will be to show the changes to which matter is constantly subjected, particularly animal and vegetable matter. That animal matter is the product of vegetable matter, every reflecting mind must be aware. Were the earth for a certain period of time rendered incapable of yielding her vegetable products, the existence of animated beings would necessarily cease;—they could not be supported—by famine would they perish. Animal matter is but the concentration of vegetable matter, and formed from the albuminous principles residing in vegetable matter. Both animal and vegetable matter are characterized by the same elementary and chemical constituents—they both require similar degrees of temperature for their existence, moisture, air, light, heat, and the influence of electricity generally, or destruction attends them. Both are subject to decomposition, and the products of each are of a similar character. The direct changes that take place in vegetable matter in order to produce vegetable mold, are but three, and are of the character which we define as fermentation termed vinous, acetic and putrefactive. Some authors have undertaken to define another, "the saccharine," and attempt to illustrate it by the formation of starch into sugar, the malting of barley, and the ripening of fruits, or that principle by which sugar is developed. Sugar is a compound of hydrogen, carbon and oxygen. Starch contains the same constituents, but its proportions of oxygen and hydrogen are less than in sugar; consequently, when starch absorbs a greater proportion of those two gases, it is converted into sugar: it is upon this principle that sugar is always formed. It could be formed upon no

other even when found in its native state as in the sugar cane. It is the absorption of oxygen and hydrogen in the shape of water by seeds which cause germination. Seeds cannot germinate when deprived of oxygen. Neither can the process of fermentation take place unless there be sufficient mucilage and saccharine matter present. One fermentation succeeds the other in rapid succession unless some means are adopted to arrest it. First,—the vinous ; second, the acetic ; third, the putrefactive. Take, for instance, the juice of the apple, the grape, the sugar cane, or any other article containing saccharine matter ; suffer it to remain in a proper temperature, and the air to have access to it, the vinous fermentation directly commences, characterized by a constant motion of the fluid in every direction with considerable disengagement of carbonic acid gas, air bubbles being diffused over its whole surface. When the vinous fermentation is complete, if it be then committed to the still, the product thrown over would be alcohol. Were it suffered to remain and not subjected to the action of the still, it would immediately enter upon a second fermentation, which would be the acetic, in which acetic acid (vinegar) would be formed at the expense of the alcohol.—The acetic fermentation would be followed by a third called the putrefactive, which would be a decomposition of the whole, rendering it like muddy water, as is frequently observed by individuals when vinegar stands exposed to the air for some time " that vinegar is dead."

Thus do we perceive that vegetable matter derives its power of existence—its elementary principles from the atmosphere which surrounds us, and is constantly undergoing the various changes above alluded to : among which, is to be regarded in a most important light its formation and support of animal matter : it becomes a vegetable mold capable of furnishing that support and sustenance to future vegetable productions as far as may be required in the economy of nature.

Thus has the great author of nature so organized laws which constantly act in concert : which laws are irrevocable and unchangeable : and to us are given intellect and capacity to understand and comprehend them. If it were not designed that we should investigate and comprehend, for what purpose do we possess intellectual faculties ? Superstition may contend that we possess no such right, and Ignorance may suppose such knowledge unattainable. But we, from the strongest conviction of right allege that we have a right—a perfect right to push our enquiries to the utmost limits of the Laws of Nature. Without this investigation how are we to be possessed of the phenomena of nature ? It is the neglect of this study which has filled the world with thousands of speculative ideas on which theory after theory has been constructed, each in quick succession following the other, until at the present time there exists not a single theory, (although its author may have been one of the most distinguished of his day) that receives the sanction of a solitary individual in all its parts. Had the minds of men been directed to the discovery of facts, drawing their conclusions from them alone, there could not have existed at this day the visionary ideas by which the great mass of professional men are governed. It is a fact much to be deplored that even those who are esteemed as scientific men have scarcely an idea of their own, or attempt to advance one but that which they have acquired by reading some book. It was the opinion of this or that author, and receive it as orthodox without a single reflection ; adopt it, and in many cases have not the power, even if they had the will, to decide upon its correctness or incorrectness. Such men exercise no opinion of their own ; it is the opinion of others ; and what is still more remarkable, they are so united to their prejudices that they cannot suppose it possible that any information whatever can be derived

except through the acknowledged advocates of their dogmatical oligarchy.

The time, however, has arrived, when those dark mists—the spell which has so long bound true science to the car of superstition, should be dissolved—the chain broken—the mist dispersed, and the standard of science erected upon that true and imperishable foundation — FACTS AND EXPERIENCE! It is time that the reign of Experiment in Medical Science should cease: it has ruled the world with an iron grasp.—Thousands have been the victims sacrificed at its shrine. Let Revolution—Revolution be the cry through mountain and glen, valley and plain, until this hydra of medical aristocracy be shorn of its fangs—until the tears shed by suffering humanity shall cease to flow, and the sunshine of hope cast abroad its bright beams of joy upon a no longer oppressed and suffering human nature. Let those parents who have lost a beloved child by that violent and ignorant practice which characterizes the medical profession, raise the cry of Revolution! Let her whose home is left lonesome and desolate, without friend or protection for her orphan children,—who feel the untimely death of a father and friend—all, all raise the cry of Revolution! Let them refuse at once admission to their threshhold, the administrator of poison, or his violent depletive agents. Let ALL unite in this great work, and the ruddy countenance, vigor of mind and body, will soon afford the most ample evidence *that the work is done!*

Our great object at present is, if possible, so far to interest the public mind, as to induce enquiry and investigation regarding the very important subject of the nature of disease, and the nature of remedial agents. That it requires such investigation, every day's experience fully proves. To say that no improvement is required in medical science, is to say that it has acquired the highest elevation which it is capable of attaining

—that no further knowledge can obviate the difficulties at present existing, which render the treatment of disease of every description so ineffectual. If medical science be perfect, why are there so many different theories? Why has it ever been that one theory in a short time has been supplanted by another, and in many respects entirely of an opposite character? It may be alleged that, as the science progressed, the discovery of new facts led to the adoption of principles of a different character. Suppose this to be the case, does the evidence resulting from their practical effects show the subsequent practice to be of a more efficient character in the cure of disease? There can be but little value attached to any new discovery unless its utility is in a greater proportion beneficial to community at large. Are not diseases as fatal in their terminations at this day as at any previous period of the existence of our species? In fact, diseases are not so successfully treated by the moderns, as they were by those physicians who existed 500 years ago, who made no pretensions to the science of which we now so frequently boast. The imposition with which the world is filled, shews conclusively the low ebb at which the science of medicine stands at the present day.—Could imposition and quackery be practiced upon community if the science were established upon those principles of truth and knowledge of which it is eminently susceptible? The whole science has ever been and is yet but a mere principle of experiment—all the boasted knowledge that has ever been applied to it has been the result of experiment or accident, and as such, and only as such, has it received the sanction of the medical world. Peruvian bark was discovered by an Indian; mercury by one of the most notorious quacks that ever disgraced the records of the history of medicine; antimony by a monk, &c. Very few of the discoveries made of the various articles used as medicine, have been made by physi-

cians; they have generally owed their origin to some unexpected circumstance or occurrence. The whole of medical science is but a collection of those accidental discoveries—a record of performances under certain circumstances, or in the hands of some individual who attributed to them the most extraordinary powers and properties, frequently extolling their virtues even to magic. The only inducement which has existed to use a medicinal agent has been because some one has used it and found it capable of producing certain effects—it has been heard of, read of, &c. Thus have the various classes of medicine as cathartics, emetics, sudorifics, expectorants, &c., had their origin: but how or why they act as such, has scarcely if ever been the subject of enquiry, much less of investigation. Medical men have rested *quite satisfied* never to pursue their enquiries farther than the mere operation of an article, deeming that knowledge amply sufficient for the practice of the healing art in all the various and intricate changes and actions of disease. Is this medical science? Is this the science of which we boast? It is the want of this knowledge which has led to all the various medical theories. It is the ignorance of the specific properties or qualities of medicinal agents which has led to the most unsuccessful and injurious treatment. It has opened the door for quackery and imposition in every form. In fact what is called the *scientific practice* is in itself no better—it is empiricism. For a while one article would appear capable of accomplishing wonders, when, finding a case or two in which it was unsuccessful, it was abandoned for some other which in a short time was doomed to a similar result. Why it was so, or why it acted thus, or why the necessity of such a change they remain in utter ignorance of; and hence, some of our most valuable remedies may be brought into disrepute. It is the same principle which has led them in not a few instances, to make trial of almost every ar-

ticle in the materia medica. The whole practice of every order is try this, then that, then something else, until their resources are exhausted; the patient constantly growing worse, they then abandon the case as past cure. The friends and relations hear the unwelcome intelligence, that no further hope remains, and the patient is left to his fate, with no prospect of recovery: when peradventure, some old lady, with nothing but a little catnip tea restores the patient to health! or being left alone, and not subjected to the action of injurious medicines, recovers his health again *without scientific aid!* Does this prove anything or nothing? Does it not show the want of that knowledge necessary to treat disease? Under such circumstances, it cannot be matter of wonder that the quack, the impostor so frequently succeeds; and how often does he succeed where the utmost efforts of the regular practitioner have proved unavailing. In what consists the difference between the regular physician and the most notorious quack? The quack knows his pills will act as a cathartic—that his powders will act as an emetic. If this is all that the regular physician knows respecting jalap, ipecacuanha, &c., where, I ask, is the difference between them? They both practice upon supposition, and are alike liable to error. But why medicines act as they do; the cause by which their effects are produced upon the human system, they both remain in perfect ignorance. Medical men but spend their time and efforts in vain to subdue quackery so long as this state of things exists. With themselves, and them alone, the evil lies. No laws can restrain individuals from employing whom they please, or from using what medicine they please; nor should they; it would be an infringement upon the people's rights. Laws for the protection of any set of men, in the exclusive enjoyment of certain rights which in truth are the rights granted to all by our free constitution, are unjust to the many, and favouriteism to the few, which by no

power of reason can be justified. But if medicine be rendered a science as it truly is and ought to be, mountebanks in the profession must necessarily cease ; the distinction would at once become so great between the scientific physician and the quack, that the most indifferent observer could not but instantly discover it—the success in the treatment of disease would then acquire a degree of certainty which under present circumstances, it is impossible ever to attain.

We may talk forever on anatomy, a knowledge of the structure of the human body in all its intricate formation ; yet that of itself is altogether incapable of furnishing the requisite information ; it amounts in reality to nothing in the cure of disease. Its inefficacy was never more fully illustrated than in a recent remark made by a distinguished anatomist, and which has lately met the public eye. He being asked one morning by a gentleman, " How is it, Doctor, that you who know every bone, muscle, ligament, cartilage, nerve, &c., of the human body, cannot cure every disease ?" To which the Doctor replied : " the watchmen of this great city know every street, lane and avenue, but they cannot tell what is going on inside the houses." To say that a knowledge of anatomy is calculated to subdue quackery, is nonsense ; and only argues in such person the want even of common intellect. To treat disease upon proper principles, requires a knowledge of " what is going on inside the houses ;" the nature, character, properties and qualities of the fluids circulating in the blood vessels, and all other conduits of the human body ; their chemical constituents, the changes under any circumstances they can be subjected to ; and how and why the effect is produced ; and what agents are engaged in such process. To practice medicine correctly and scientifically, an accurate knowledge of the chemical constituents, both of the fluids and solids of the human body is absolutely necessary ; and likewise, a perfect acquaintance with

the chemical constituents of all agents employed as medicine, and the chemical and direct action they are capable of producing upon animal matter, when applied in the form of medicine?

The Science of Medicine has ever been shrouded in obscurity—clothed in such a mysterious garb that few uninitiated into its peculiar characteristics, have ever been capable of comprehending its intricate character. To give them in detail, would far exceed the limits of the little volume we here design to present to the public. We shall therefore give but an abridged historical view of its progress since first introduced as a science, in which we shall refer somewhat in detail to the notions, opinions and theories which have at different times since its first establishment acquired adherents and supporters, particularly those of that character evidently objectionable.—Diseases of various descriptions apparently have existed from the earliest period of time of which we have any correct information. We find them spoken of in the writings of Moses, Lev. 26, 16.—Deu. 28, 22, wherein he speaks of Consumptions, burning ague, fever, inflammation and extreme burning. Diseases of a similar character to those which now exist, appear from all the information we can collect, to have ever existed since the origin of our species. It could not be supposed otherwise, since the same causes by which they are generated must have existed at all periods of time since the formation of this planet from chaos. The primary causes of disease constantly surround us every moment of our lives, and are those from which it is impossible for us to escape; and may eventually be traced to the noxious properties charging atmospheric air and aliment. The air which surrounds us may become surcharged with carbonic acid gas, which is a product constantly produced from the decomposition of both vegetable and animal matter; which is always, and in all parts of the world taking

place ; more particularly in warm climates and at warm seasons of the year, than in cold. Carburetted hydrogen gas exists in abundance in the neighbourhood of marshy pools, lowlands and swamps, or where is found considerable standing or stagnant water. These gases give rise to various characters of fevers, as bilious, remittent fever, ague and fever, &c., as they necessarily more or less are absorbed into the lungs, and consequently carried into the circulation, by which means disease is generated, as will be hereafter shown. As all animals are subjected to disease, and may be diseased more or less, and we be insensible of it, we, therefore, by partaking of their flesh may have a proportion of that virus which they were possessed of, imparted to us. Did we abstain from animal food entirely, and live on vegetables alone, we should be liable to the same mishap. Vegetables may become charged with substances deleterious to health, by growing upon ground subjected to the decomposition of vegetable or animal matter, which by imparting to the vegetable its noxious properties would prove the most deleterious. Vegetables are also liable to imbibe pernicious properties from the atmosphere, and become of a character the most poisonous, which, generally speaking, in many cases, would be impossible for us to detect, and hardly even to suspect, until their pernicious effects were irreparable. It is well known that some kinds of grain, particularly rye, is liable to this evil by becoming what farmers call blasted : the change which it has then undergone renders it fatal to those who partake of it, even when formed into bread. Instances of the extensive ravages of disease from this source are frequent in various sections of the United States. It is frequently made use of by medical practitioners under the name of *ergot*. Even the water we drink may be charged with substances deleterious to health by its passing through the various strata of earth, by which it may become charged

with some soluble substance of a poisonous character, which may lay the foundation of disease. To escape disease is impossible, as we are surrounded by those causes which generate it every moment of our lives. If the heat of a meridian sun strike intensely on the tender organ of the brain, producing disease, can we restrain its power? Or the cold blast of winter act harshly on the breast of the hectic, can we arrest its force?

The Ancients do not appear to have had any mode whatever of treating diseases by the administration of medicines;—their attention appears to have been directed against the spreading of contagion by enjoining cleanliness, and certain regulations together with various ceremonies. The practice seems to have been exclusively confined to priests, magicians and astrologers, and to have been of the most superstitious character, attended on the part of the people with great credulity.

It is somewhat perplexing to the inquirer, in his researches for the origin of one of the grandest sciences that ever enlightened and humanized mankind, to find that it is hidden beneath the veil of mystery and obscurity. In tracing this science to its first germ—now spread into a thousand branches—we have to encounter the lapse of ages, the superstition of the ancients, and the allegories and fables with which they have invested it. But, while the gleam is somewhat faint and dubious, arising from the mystification of its source, we are still left to the conclusion that the science of medicine was co-eval with the existence of mankind.

Long before the universal medium of intelligence was invented, or letters established through the world,—which have ever since controlled and civilized the rudest minds, checking the "mad infatuation" of the great, and refining and improving the heart—there must have been some means by which the afflictions of the body were alleviated. Though history gives

us no reliable data on this subject, yet it is a necessary inference, deducible from the nature of our organization. It is impossible for human nature to escape disease, since we are so constituted as to be susceptible of the influence of circumstances; yet it is obvious that the primary stages of human existence, were somewhat exempt from its enervating attacks.

The ancients were unknown to the thousand diseases which now assail us on every hand; and especially those which have been instituted among us by luxury and voluptuousness.—Rude—unrefined by our thousand labouring arts, and partaking of the coarsest food, they were comparatively free from disease. The chase, with which they were delighted, was their chief pastime, and yielded much of their fair; and, when the innovations and aggressions of their neighbours strung their nerves in the defence of their hearths, they were fierce and intractable. But, as a knowledge of their means of curing the wounds to which their ferocity exposed them in their strifes with their feudal opponents, must be left to conjecture, still we are led to the belief that they had their balms—their astringents, their sudorifics, in fine, a Materia Medica in all save name. Their wants were few, consequently their ailments were few, until they degenerated, and gradually became luxurious: for such is the power of luxury over the animal economy, that it not only corrupts and vitiates the functions, but reduces them to a state of languor and effeminancy which unfit them for their systematic offices. We are constrained to deplore this departure from their frugal and economical usages, since it has established a multiplicity of diseases, and consequently given us a host of philosophers.

By concurrent historians, it appears that the Chaldeans were the first who attempted the collection of a Materia Medica.—It was a custom among them of exposing their sick to the public gaze, and making it imperative on all persons to state what

they knew in regard to medicine. And here we behold the first faint ray previously to the outbursting of this splendid science. However, the superstitious tinge which it afterwards obtained from the Chaldeans, in consequence of their total ignorance of the laws that govern the animal economy, completely divested it of a portion of its utility. But it was not destined to remain long in this state.

At this early period, however, the knowledge of medicine must have been extremely limited, and confined to a very few. The ancients were in no wise prone to the placing of too much confidence in medicine, the secrets of which they knew but very little. Their reliance in Divine Interposition, in case of sickness, and their ever-burning fires of sacrifice upon the altars of their Gods, for the purpose of averting disease, placed them in a state of secured ease as to its power or ability to approach them. Under this mistaken idea of *special preservation*, few were found able or willing to throw off their superstitious observances, for what seemed to them extremely frivolous—*the alleviation of disease by earthly agents !*

In this state of ignorance and duplicity, they continued to an indefinite period ; and it was long ere those advocates of medicine, who have since shown in the bright blaze of philosophy, could win their confidence as to the curability of disease, except by special divinity.

It is somewhat paradoxical, that a people so ignorant and incredulous on the score of medicine, should have eclipsed the world in Sculpture and Architecture.

Melampus, of Argos, the most ancient physician, of whom we have any record, appears to have understood the nature of disease, at least as well as could be expected, considering the rude state of society, and the difficulties with which he was surrounded. He cured one of the Argonauts of sterility by the rust of iron and wine, and King Proteus of melancholy.

"In our researches," says Dr. Paris, "to discover and fix the period, when remedies were first employed to alleviate disease, we are left in conjecture and involved in fable. We are unable to reach the period in any country when the inhabitants were destitute of medical resources. We find among the most uncultivated tribes, that medicine is cherished as a blessing and practiced as an Art, by the inhabitants of New Zealand; by those of Lapland and Greenland; of North America, and of the interior of Africa. Charms and amulets were the expedients of the barbarian, ever more inclined to indulge the delusive hope of superstition, than to listen to the voice of sober reason. Traces of amulets may be discovered in very early history; for Galen informs us, that the Egyptian King, Nechepsus, who lived 630 years before the Christian era, had written that a green jaspar, cut into the form of a dragon, surrounded by rays, if applied externally, would strengthen the stomach and organs of digestion. We have, moreover, the authority of the Scriptures in support of this opinion; for what were the ear-rings which Jacob buried beneath the oak of Sechem, as related in Genesis, but amulets? Theophrastus pronounced Pericles insane, because he discovered that he wore an amulet about his neck."

But very few of the doctrines of the ancients relating to medicine, are found to proceed from what should be their only source, a complete knowledge of human nature. They knew not that this is the living spring from whence they should have drawn their treasure; consequently, they have involved their theories in baseless speculation. On all subjects beside, of which we have any knowledge, we are completely amazed at their superior tact and genius. Indeed, we are lost and bewildered in contemplating their perfect models of Art, and the beauty and perspicuity of their Literary achievements!

The Romans, disregarding every tribute to the shrine of

knowledge, contented themselves with being the first in arms; but her sister, Greece,—although her annals are not empty of the blazonry of martial deeds,—seemed swayed by the fire of a more laudable ambition—the culture of Science and the establishment of Letters. The Roman Empire, in its subjection of Greece, became their inheritors, and profited largely from a science, the theory and principles of which they had theretofore been ignorant; and, consequently, with the rising generation, became conspicuous in the annals of chirurgery. The Classics of Greece, yielding the influence of their powerful genius, warmed the heart of the rude Roman; and, like the earth-reaching medium of intellectual virtue, showered upon their laps, in great profusion,

"Barbaric pearls and gold."

The principles of the Science of medicine now spread over the ample field in which it was destined to act a leading part, drawing in its train, by the vigour and importance of its salutary tenets, the greatest talent, and holding out individual aggrandizement, because of its absolute bearing upon the weal of the world. Under such circumstances, the healing art became established, and its principles promulgated for the relief of mankind. But, as we proceed, we find that it was planted in a barren soil, or that its meek progenitors and fathers were callous of its preservation; for, by the might of priestcraft, it was wrested from the grasp of its legitimate possessors, who held it with a weak hand, and all progress towards its general tendency, rendered at least for a time, impossible.

Thus their religious power and temporal government became enhanced by the addition of a code of medical ethics, which gave them an ascendency, not only over the spiritual, but also, over the bodily and corporeal attributes of man. And how did they use these important acquisitions? They fet-

tered the soul with the adamant of their clerical prerogatives, and corrupted the flesh by the mal-administration of medicine. A science that had bid fair to be of the greatest importance to the world, was thus chained, perverted, and rendered impotent by a host of monks and selfish Churchmen. Did they stop there? Were they contented with the undisputed possession of their power over the soul and body? The pages of history tell us they were not. Nor did they rest until they had garnered within the walls of their polluted Convents, the Science of Letters — the power and wealth of the mind. Armed with the spiritual attributes of the church, and treading upon the twin sciences of Literature and Medicine, they were ready to commit the greatest ravages, always hiding beneath the ample folds of the church, the most wanton and cruel usages. But the beclouded horizon was soon sundered and dispelled, and the light of reason again spread its warm breath over the groaning shadows of religious oppression.

With accumulating wealth, luxury, and sensual gratification usurped the healthy athletic sports in which it was part of the religion of the Romans to indulge. They soon saw the necessity, from the ravages of disease, for instituting the science of medicine, and giving it that protection from the hurtful tendency of clerical dictation, which was found necessary, in order to shield themselves from those ills, with which their intemperance had threatened them. Thus freed, and supported by the most powerful, the Science of Medicine took a renewed start; and in process of time neither the patrician nor plebeian, regretted its enlargement from the hands of the monks.

"Rome had existed for five hundred years," says Mr. Dunlap, "without professional physicians. Like all semi-barbarians, they believed that maladies were cured by the special interposition of superior beings. Deriving, as they did, much of their worship from the Etruscans, they probably derived

from them, also, the practice of attempting to overcome disease by magic and incantation. Cato, the Consor, was the first of his countrymen who wrote on the subject of medicine. In his book of Domestic Medicine, duck, pigeons and hare were the food he chiefly recommended to the sick. His remedies were principally extracted from herbs,—and colewort, or cabbage, was his principle cure. The recipes, indeed, contained in his work on agriculture, show that his medical knowledge did not exceed that which usually exists among a semi-barbarous people, and only extended to the most ordinary simples which nature affords. Cato hated the compound drugs introduced by the Greek physicians, considering those foreign professors of medicine as the opponents of his own system. Such, indeed, was his apathy, that he believed, or pretended to believe, that they had entered into a league to poison all the barbarians, among whom they classed the Romans. Cato, finding that the patients lived, notwithstanding this detestable conspiracy, began to regard the Greek practitioners as impious sorcerers, who counteracted the course of nature, and restored dying men to health, by means of unholy charms; and he therefore advised his countrymen to remain steadfast, not only by their Roman principles and manners; but, also, by their venerable unguents and salubrious balsams, which had come down to them from the wisdom of their grandmothers." We think the stoic Censor quite right in this latter proposition, as they consisted of the mildest preparations of roots and plants. But this violent and prejudiced man thought to govern the possessors of the wealth of the universe like a convent of monks, or as he managed his own household.

During this stage of uncertainty, in all that respected the Science of Medicine, several other writers and practitioners of medicine appeared; but their theories were effeminate, and wanted that solidity of structure, which is found indispensable

as a basis for the erection of the doctines of Physic. Confined and narrow as their views must have been in regard to this science, the Romans, by this time, conceived their materia medica to be replete in all its features ; and that there was no room for innovation and improvement. But, it soon appeared, that the whole fabric had been woven from so fragile a thread, that it was completely cast down and trampled upon by succeeding practitioners, and expunged from the records of their materia medica as so much useless trash. Indeed, it was with good reason that it so suffered ; for, though somewhat enlarged upon by its professors ; and, besides, containing many useful hints in therapeutics, as, also, an indifferent, but somewhat acceptable view of the nature and power of disease ; yet, in many of its points, where the utmost harmony and concord was looked for, it abounded in superstitious parables, and abortive speculations.—These, by degrees, were reformed in proportion as new practitioners made their appearance ; or, as well as the rites and observances of the age were capable of reforming. But still their doctrines were very exceptionable from its non-conformity with what has since been ascertained to belong to the immutable laws of nature. A nation, whose worship and religious duties, apart from their private and domestic character, were of the most delusive quality, could not, with a just allowance, be deemed capable of following these dictates in the Science of Medicine, when their opinions on what was most holy and righteous, were of a tendency bordering upon the most consummate ignorance.

About this period, and beneath the atmosphere of such depravity, in all that should have been held most secred, a new spirit made its appearance in the person of the renowned and classical Celsus. He flourished in the second reign of the imperial dynasty. His writings, at least that portion of them which relates to medicine, have been received by the mo-

derns as a work of great merit. The opinion has prevailed that he did not follow medicine as a profession, but only with the view of instructing himself in this branch of philosophy so far as it consisted with the preservation of his own health.—Be this as it may, his works on medicine evidently show erudition; and when they are divested of the superstitious tincture which they received, more from the rude state of the times in which he wrote, than from any predisposition of his own, they will be found useful and instructive. The opinions of Celsus were somewhat exhorbitant in view of the present state of medical ethics; but, though incompatible with the natural dictates and feelings, which alone should be their beauties, they are sufficient to show that at that time the Science of medicine had been invested with

"A local habitation and a name."

What from wars—civil and foreign—and the consequent overthrow of the equipoise of Literature, and the general obstruction of the channels of Science and the Arts, it is but reasonable to suppose that medicine suffered in common with the rest; for such distractions are likely, even in this age, to intercept the quiet progression of science. Under such misfortunes, the materia medica of the Romans was destined to suffer: it lacked in repletion, as, also, its progenitors the requisite calm for its prosecution to the literal degree of human attainments.

Pursuing our enquiries to a later period, we find, shortly after Celsus, two other individuals who appear to have made themselves conspicuous in systematizing and arranging the laws of medicine:—these are, Dioscarides, and the elder Pliny. The former, a celebrated Greek Physician and Botanist, who is supposed to have lived in the time of Nero. He paid particular attention to medicine, and especially to botany. Al-

though several eminent physicians have written much in derogation of him as a physician—probably because of his botanical principles—yet I am inclined to the belief that his system was at least not inferior to those of his contemporaries. He had his followers and advocates, and also, his opponents.—However, like all his predecessors, he appears to have been stimulated by motives of ambition rather than philanthropy—looking at the general welfare of the science as an after consideration. The numerous transitions which the science had undergone by this time, in consequence of the fluctuating character of the disciples of each school, became proverbial.—Crude, unsound, savouring of barbarism, and begetting a combination of selfish axioms with the view of crushing opposition, the practitioners of the Healing Art eventually retrograded to the most preposterous principles.

The acquisition of the experience of the ancients in the formation of our modern materia medica, has been somewhat productive of evil, and that too, when the redundant parts and false hypotheses, have been apparently lopped off. In a word, so far as we have traced the subject, there appears to be a remission of the first principles of medical philosophy, and a dissonance in their premises with the regular and imperious codes of nature. I have wandered along to this conclusion with some regret, and deem it hardly possible that a people who have been considered as the modellers of literature, and the fine arts, should so far fall below the moderns in point of medical knowledge. We have some notion of sculpture—but we have never been able, nor ever will be able, to produce rival specimens. Whereas, in the science of medicine, in which they had an equal chance to surpass us, as in any of the arts which I have named, their disquisitions are curious and inferior.

Decidedly warlike—and burning for the extension of their arms to all parts of the world, any art but what contributed to this end, was considered, by the Romans, as comparatively unimportant, though its prosecution should tend to the alleviation of disease, and the manumission of the ills of life. After the death of Galen, the progress of medicine in this stupendous empire, became completely paralyzed, indeed it may be said to have stopped entirely; for all improvements were put completely out of the question. The repeated agressions of the Romans, and other acts of oppression which they instituted in view of national aggrandizement, soon brought upon them the barbarous tribes of Arabia, and other nations which completely inundated their provinces: thus fell imperial Rome, flanked upon seven hills by the swarthy Saracen, and dragging with her to the dust, her palaces and monuments of grandeur.

In consequence of the victory of these savage invaders, over the city of the Cæsers, (which, however, survived, and phœnix-like, rose prouder from her ashes)—the progress of medicine, was for a time completely suppressed; nor was it till the commencement of the ninth century that it again rose from its depressed state.

In order however that the reader may have a comprehensive view of the whole science of medicine from its earliest establishment, we will endeavour to give its history somewhat in detail by which the various opinions, theories and doctrines since its first origination may be the more fully understood, reserving our comments upon them until we shall have arrived at our own times.

Esculapius is the first individual whose name we have on record as a practitioner of medicine; but his history appears so completely involved in fable that no dependence can be placed in the account given respecting him. He was a Greek, and is alleged to have been the son of Apollo by the nymph Coronis,

born at Epidaurus, and educated by Chiron, who taught him to cure the most dangerous diseases, and even to raise the dead. Homer gives an account of the two sons of Esculapius Machaon and Podalirius being engaged at the siege of Troy, but their only office appears to have been to bind up wounds. Some time, however, elapsed before Esculapius was favoured with divine honours, or became deified, and temples raised and dedicated to him, in which tablets were hung, and on which were recorded the diseases cured, as they imagined, by his assistance ; and from which period he was reverenced, particularly by the ancients, as the God of Physic.

Little progress appears to have been made in the Healing Art for many centuries.

Greece—first in the field of Medical Science, the seat of the Muses, gave us Hippocrates, who flourished about four hundred and sixty years anterior to the birth of Christ. He was the first that studied medicine as a science, and from whose writings, which have descended to us, we have gleaned a great deal of useful knowledge ; but they are also celebrated for the most crude and absurd doctrines. He is reckoned the eighteenth lineal descendant of Esculapius, the profession of medicine having been hereditary in his family. Born with this advantage, and stimulated by the fame of his ancestors, he devoted himself zealously to the philosophy of medicine. Though history gives Hippocrates the merit of being the first scientific classifier of the science of Medicine, yet we find an Alexandrian physician, by the name of Aaron, who wrote in the Syriac tongue, about six hundred and twenty years before Christ—thus preceding Hippocrates 160 years.

Hippocrates having acquired the title of Father of Medicine, we shall commence our illustrations on this subject with the pathological doctrines *first* by him introduced. He considered that the fluids were the primary seat of disease, which

opinion generally prevailed among all classes of medical men down to the eighteenth century, under the name of the *Humoral Pathology*. He supposed that there were four humours in the body, blood, phlegm, yellow and black bile. He likewise introduced the doctrines of *crises*, or that there existed a certain tendency in the system at certain periods to a cure of disease which proceeding regularly, dispelled morbid action. He assumed certain theoretical principles respecting the powers and functions of the human body. It was with him that a specific principle first originated which he called "*nature*," and which he alleged influences, superintends, directs and controls all the motions of the coporeal frame: which specific principle was likewise possessed of an *intelligence*, by which it repressed those actions having an injurious tendency, and promoted those which were beneficial.

The practice of Hippocrates consisted in the employment principally of evacuents, and although many of his admirers in their writings would favour the opinion that his practice was of the mildest character, we cannot but arrive at a contrary conclusion. He employed purgatives of various kinds very freely and often of the most drastic character. He likewise employed sudorifics and diuretics—he drew blood by the lancet freely, sometimes opening two veins at once, and frequently bled until it produced fainting. He used the scarificator and cupping glass, administered injections, and inserted issues. His external applications were ointments, plasters, liniments, &c. The remedial agents which he employed were exclusively of vegetable origin, as the various mineral and metallic agents brought into use in modern practice were then totally unknown. Many of the remedies used by him yet retain a place in our pharmacopoeias.

Hippocrates transmitted his profession to his two sons Thessalus and Draco, and to his son in law Polybus, who established

as is generally supposed the first medical sect, and which they named the Hippocratean school; but soon became more generally known as the Dogmatical school or sect, in consequence of the adoption of certain theories and principles of practice advanced by Hippocrates. These theories being considered erroneous by some, and calculated to lead to injurious results in practice, soon gave rise to another medical sect called Empirics, who discarded all theory and advocated the establishment of medical science, upon no other basis than that of experience alone.

After the establishment of the Alexandrian School, about three hundred years prior to the Christian era, the science of medicine was pursued with great assiduity; and where the first medical professors were appointed to the different branches or professorships as anatomy, pharmacy &c. It is here we find the first instances of dissection of the human body practiced by Erasistratus and Herophilus, for which purpose the bodies of criminals were allotted them by the government, by which means much information was acquired in regard to the human system not previously known: dissections had only heretofore been made on Animals. Erasistratus had studied with Chrysippus, who opposed bleeding and active remedies in the treatment of disease. Entertaining and advocating those principles, he is therefore not held in as high estimation by a portion of the medical world as his associate and co-laborer Herophilus, who advocated the use of most energetic agents. Some authors state that they opened bodies while alive to discover their internal motions. Erasistratus described the brain, the heart and large vessels, liver and kidneys, and pointed out their offices, but supposed digestion performed by tituration. He supposed fevers and inflammations to arise from the blood being forced through the minute veins into the corresponding arteries. He is said to have terminated his existence by taking

poison at an extreme old age, having been tormented for a long time with an ulcer on his foot. The two rival sects the Dogmatists and Empirics had for some hundreds of years, kept the whole medical world in commotion. About this time the Empirics organized themselves into a distinct body as the declared opponents of the Dogmatists.

The next account given us is from Pliny who tells us that about two hundred years before Christ, Archagathus a Peloponnesian established himself as a practitioner in Rome. He was received with great respect and even supported at the public expense. His practice however was very severe, generally using the knife and powerful caustics, and consequently so unsuccessfully as to excite the dislike and disgust of the people against the profession generally. At this time a fatal epidemic prevailed at Rome in order to allay which the senate determined to introduce into Rome the worship of Esculapius; they therefore consulted the Sybilline books, and found it obligatory upon them to transfer the worship of this deity from Greece to their city. A deputation was therefore appointed for that purpose; but the deity being unwilling to leave his native place, was forceably siezed by them, and conveyed to Rome under the form of a serpent, where the people received him with great transport, and erected a temple to him on an island in the Tiber, and appointed priests with the ceremonies accordingly, and the plague is represented to have ceased. In fact, the most abject superstition had ever been attached to the car of medicine both by the Greeks and Romans.

Little more transpired in respect to the Healing Art for the next century, during which time it was retained in the hands of superstitious priests, and subjected to all their rites and ceremonies, charms and incantations. About one hundred years before Christ an individual named Asclepiades, acquired considerable popularity in Rome in the practice of medicine.—

Medical authors, especially modern, speak in no enviable s of his reputation, although they admit him to have been a man of good natural talents and acquainted with human nature ; a man of acuteness and discernment ; yet it so happened that he was not regularly bred to medicine, but originally taught rhetoric at Rome. They allege that he had but "little science or professional skill;" that he was ignorant of anatomy and pathology ; and because he deprecated harsh and violent remedies ; was opposed to emetics and purgatives, and recommended bathing, exercise, diet, and mild treatment, attended in all cases his patients with assiduity, and contributed to their comfort ; he was opposed by the prevailing theorists then existing ; and not having entered the medical profession the "regular way," he was not of the true "scientific stamp," and of course heretical. Yet he acquired an eminence in his profession which he maintained to the end of his life, and which many of the ancient as well as modern practitioners might well envy. Medical writers are, however, compelled to admit that they are indebted to him for many important arrangements in disease : with him originated the distinction between the two great classes of disease, as acute and chronic. His object was to reduce the science to a few general laws and so to simplify it as to render it universally intelligible and of easy application. He advocated the philosophical principles of Epicurus, and supposed that acute disease was produced by a constriction of the pores of the skin, and that chronic disease was a relaxation of the pores. It is said that he pledged his reputation on the preservation of his health which he retained to a great age, and died at length from a fall.

After the death of Asclepiades, his pupil, Themison, continued to advocate his principles, and was successful in establishing a new sect in medicine called the Methodic sect, which for some time eclipsed all the former. The doctrines of this sect

seemed to be to adopt a medium course, or one between the Dogmatists and Empirics, and to adopt from each that which possessed the most excellence. They contended that it was essential that the practitioner be well acquainted with the nature of the human frame, the laws that govern it in a state of health, and the changes to which it is subjected in disease. The Methodics considered the solids as the seat of disease, which was contrary to the opinion of Hippocrates that had always heretofore prevailed, and which was directly in opposition to the Humoral Pathology then advocated both by the Dogmatists and Empirics. Thus we perceive that at this period of time there existed three different and distinct sects of medical practitioners, each in many particulars, both in theory and in practice, essentially differing from each other. The Methodics were diligent and sagacious in the particular phenomena of disease, and the employment of remedies. The opinions and doctrines of the Methodics appear to have been generally adopted in Rome, and almost to have superceded their rivals.

About fifty years anterior to the Christian era, Thessalas made his appearance. He is said to have been of mean birth and defective education, and to have acquired great wealth and a high reputation as a practitioner. Yet if his biographers be correct in their remarks respecting him, he possessed no inconsiderable share of egotism, as it is said that he styled himself the "conqueror of physicians." He advocated a theory, as he alleged, which would lead to more correct practice. What this particular theory was we at this day are unable to determine. Medical writers consider him as an unworthy character; how far this may be, we have no correct source of judging, as all the records of the rise and progress of medicine are written with no little degree of prejudice and calculated to give a colouring to the whole subject the most favourable to the views of particular theorists, the aspirants to

"scientific knowledge" and fame: the fact is certain, as disreputable as he may have been, medical theorists have not failed to avail themselves and to adopt a portion of his particular principles, one of which serves at the present day to illustrate some of the most important indications to medical men, "metasyncrasis," the mode of effecting an entire change in the state of the human body.

A distinguished physician by the name of Soranus appeared in Rome about this time. He was of the methodic sect; none of his writings are now extant.

C. Aurelianus appears as the next author of importance who is supposed to have lived about the first century of the Christian era. He was considered to be a Numidian by birth; he was zealous in the Methodic cause, yet is censured for not adopting more active remedies; and his practice is hence considered defective: the reason he assigns for this course, is that he could not reconcile severe practice with the Laws of Nature. C. Aurelianus generally resorted to a preparatory course in the cure of disease which consisted in diet, exercise, frictions, use of the bath and other external applications. In inflammatory diseases, his practice was abstinence, rest and friction, which, if unsuccessful, then general or local bleeding, baths and certain vegetable preparations. He seldom if ever employed purgatives, and very sparingly employed diuretics, and entirely discarded caustics and narcotics and similar applications.

The Methodic sect gradually changed in some measure its original tenets, but was generally adhered to by the Roman physicians the most part of the two first centuries of the Christian era; but it at length became divided into several different sects. The two most important sects which arose out of the Methodic sect, were called the Pneumatics and Eclectics — The Pneumatics entertained the opinion that the human body possessed a principle which they termed "spirits," which with

the fluids and solids, constituted the composition of our system. Aretaeus of Cappadocia, who flourished about this time, appears to have been the principal leader of this sect. He was considered a medical writer of some repute. He was however the advocate of a harsh or strong practice, and very partial to hellebore and other drastic cathartics, and in favour of narcotics, bleeding, &c., and appears to have been the first individual who introduced cantharides for blistering the skin. Of the sect called Eclectics, little is known: We, however, have the name of Archigones given us as one of their principal practitioners, to whom we are indebted in some degree for the introduction of new and obscure terms into medicine, and who laboured hard to establish a medical dialect.

The next individual we have to notice is Celsus, whom it does not appear was regularly bred to medicine; but being a distinguished writer, and embracing and advocating energetic treatment in disease, has met with the most favourable reception on the part of medical theorists. In his writings, he does not appear to exclusively adopt the doctrines of Hippocrates, Asclepiades or any of his predecessors, although he advocated a similar specific principle with his contemporaries and predecessors, to which he gave the term "nature," and contended that fever was an effort of "nature" to throw off disease. He freely used the lancet, even to a greater extent than those that preceded him.

We now arrive at the account of an individual, who of all others of the medical profession acquired a popularity, which was unsurpassed by any, the distinguished Galen, who was born at Perganus, in Asia Minor, A. D. 131. His father instructed him in the rudiments of knowledge, and sent him to the best schools of philosophy. He soon displayed much judgment in selecting what appeared most rational from the different sects of physicians which existed at that time, totally

rejecting the popular systems of the day. He commenced his studies at a very early age, and although he met with much opposition from his professional brethren, who stigmatized him as a theorist, yet so successful were some of his cures, that they were even ascribed to magic. This success naturally excited the prejudices of a powerful and popular party of physicians; and being unable to contend against them, he left Rome, but was soon recalled to attend the Emperor who had so high an opinion of Galen, that he committed his two sons to his care, both of whom being seized with a fever, in which he prognosticated a favourable issue, contrary to the opinion of all his colleagues, and restored them to health. He thus acquired a power and an eminence of reputation, which enabled him to defy the envy of his opponents, and which he in a great measure availed himself of to their disadvantage. As he was a man who paid little attention to the opinions of others, confident of his own powers, of a very decided character and possessed of a superior mind, he has been accused of arrogance and want of candour. The superiority which he acquired and actually assumed, swayed public opinion on all points connected with medicine. For ages, it was deemed sufficient in argument against any hypothesis, or even matter of fact, that it was contrary to the opinion of Galen. The greater part of Galen's life was spent in study; and he is said to have been the author of 500 volumes on medical subjects. The foundation of his medical theory was in accordance with that of Hippocrates, of whom he was an ardent admirer, speaking of him with great respect, and professing to practice upon his principles. He adopts the four elements, four humours, four qualities, &c., and his system of medicine was the correcting the morbid state of the fluids, as depending upon these four qualities, or any of their modifications. He considers the fluids to be the primary seat of disease, thus again reviving the Hu-

moral Pathology, but at the same time he introduces so much refined speculation, divisions and sub-divisions, as to be in a measure regarded as the inventor. He had a strong predilection for theory, and rendered his practice conformable to it, and which he was successful in establishing over all other preceding ones. So high was the authority of the name of Galen, that for about fourteen centuries, his systems and doctrines were most sacredly adhered to, and revered by all descriptions of men.

For a length of time after the death of Galen we have little to interest us, they seem to have supposed that medical science in the then existing state of society was not susceptible of further improvement. At this time commenced the decline of the Roman Empire, which continued to grow more feeble, until its final overthrow. Sprengel states that the medical writers of the third and fourth centuries were "blind empirics, or feeble imitators of the Physician of Pergamus." Sextus Empiricus, a contemporary of Galen, who it is supposed derived his appellation from the sect to which he belonged, in his writings, attacks the principles of the Dogmatists with much severity. There are several who wrote during the fourth, fifth and sixth centuries,—but their writings are so filled with superstition and credulity as to plainly show the degraded state to which medical science had fallen. A writer by the name of Arteus, recommended the use of magical arts and incantations, expressly for the treatment of disease. About the middle of the seventh century, the Greek school of medicine terminated, and the science was consequently reduced to the most abject state. The great medical school at Alexandria however still retained its reputation, but the catastrophy which befel the Alexandrian library by the brutal violence of the Saracens, produced for a time a general wreck of literature: but, fortunately, the writings of Galen, were preserved from

this general conflagration, and translated into the Arabic language, which being commented upon, and elucidated, soon acquired a degree of celebrity equal to that entertained by the Greeks. The Arabians were previously in possession of the works of Hippocrates. The Arabic physicians implicitly adopted the speculations and theories of Galen, seldom venturing in the smallest degree to deviate from his practice. We here perceive that the science of medicine, became principally transferred to the Mahometans. Amongst the earliest Arabic writers, we have the name of Ahrum, a priest of. Alexandria, who gives us a a description of small-pox, and Rhazes informs us that medicine was cultivated among the Arabians with as much success as among the Greeks.

For the next three centuries there appears no particular writer of eminence. In the ninth century we have Serapion, who wrote in the Syriac language, his professed object being to incorporate the principles and practice of the Greek and Arabic physicians. Contemporary with Serapion appeared Alkhendi, who obtained great celebrity: he assiduously cultivated mathematics, natural philosophy, medicine and particularly astrology. He was called the Greek astrologer, the subtle philosopher and the learned physician: he applied the rules of geometrical proportion and of musical harmony, to regulate doses of medicine and to explain their mode of opperation.

A writer appeared about this time named Rhazes, who gives rather an elaborate description of small pox and measles and the treatment employed by the Arabians, but his writings appear to evince nothing original, being principally abstracts from Galen and the Greek physicians. Shortly after the death of Razes. appeared Ali Abbas called the magician, who pretends to give a complete account of medicine in its various branches: his writings however, consist principally of abstracts from Greek physicians: he enjoyed considerable reputation, but it

was soon eclipsed by the appearance of Avicenna, who was considered by his countrymen even superior to Galen. He was a man of great industry, desirous of knowledge, but somewhat fanatical, conceiving himself under the influence of supernatural revelation: his reputation became great, and for a time was without a rival. His writings appear to evince nothing new, but are principally compilations from others. He was a great admirer of Galen, and considered the ultimate object of a physician, was to be intimately acquainted with his writings, and to defend them against objections.

We here pass over a period of three or four hundred years, in which nothing of sufficient importance occurs to interest us in regard to the progress of Medical Science. The doctrines introduced by Galen, were held as oracular, and the people themselves were involved in the rankest superstition. The Arabic school of medicine terminated, and in fact, the study of all sciences became in a measure suspended. The world seemed enveloped in mental darkness. Even until the 15th century all Europe was subjected to a complete state of barbarism and superstition. The only place where any disposition was manifested in favour of science at this time, was amongst the Mahometans, who introduced into the practice of Medicine, various gums and resins, rheubarb, cassia, camphor, senna, manna, &c. But even to the 13th century all remained shrouded in the grossest darkness, and the science of medicine was reduced to the lowest state of degradation. The practice of medicine was principally confined to monks, who were grossly ignorant, and whose interest it was that mankind in general should not be otherwise. Although they adhered to the principles of Galen, yet they frequently had recourse to magic and astrology.

In the 13th century we find the science of anatomy revived; and about the year 1315, Mondini, a professor at Bologna is

said to have dissected two females. and published anatomical illustrations of the human body with plates.

The first English medical writer of whom we have any account was Gilbert, who lived about the first of the 14th century; at which time there appears to have been no public means of instruction in natural philosophy, or any of the sciences in that country: all sciences were in the lowest state of degradation, and all that was known respecting them was confined to polemical theology, and that confined to the monks. The writings of Gilbert are principally extracts from the Arabian physicians, and the medical theories of Galen. Indeed it could not be expected that from the then existing state of science, any thing more than a mere repetition of the previous existing theories and principles could be adverted to.

About this period several important circumstances transpired to change the whole aspect of general science. The feudal system which had existed for centuries, began to be shaken and a general revolution to take place, producing an entire change in the political condition of the people. The army of the crusades had been instituted for the recapture of the Holy Land; but the first capture appears to have been the City of Constantinople by Mahomet the second, about the middle of the 15th century. The City of Constantinople had long been the refuge of the most learned, who had in their possession the manuscripts of the most ancient classical writers, the existence of which were probably unknown to the world. Those men being expelled from the Turkish Empire, took refuge in Italy, and carried with them their manuscripts.

The invention of the art of printing occurring about this time, secured those manuscripts against the possibility of future destruction. One of the first uses made of this pre-eminent art, was the publication of those ancient manuscripts

which was received with eagerness. Other manuscripts were likewise discovered and published, and in the course of a few years the knowledge contained in them was extensively diffused.

Another important circumstance likewise tended to free the Human mind, and awake a general spirit of free enquiry, was the Reformation introduced by Luther; and although it had a direct tendency against the papal authority, we find that Leo X. and other Italian potentates, extravagantly encouraged literature and the fine arts. Both the works of Galen and Hippocrates, with learned dissertations thereon, were printed, in order to explain them; yet the works of Galen continued in the ascendant. Medical Science being thus encouraged, a new spring was given to it, and a number of medical schools were established in various parts of Italy.

In 1460, Thomas Linacre was born at Canterbury, in England, and after studying at Oxford, he travelled into Italy, and after perfecting himself in the Greek and Latin language, devoted himself to medicine and natural philosophy at Rome. He returned to England, graduated at Oxford, and gave lectures on physic,—was appointed physician to Henry VII. and Henry the VIII., and eventually stood above all rivalship. In 1518, he founded the Royal College of Physicians in London, of which he was the President until his death. The practice of medicine in England, was thus arrested from the hands of the monks, who heretofore had been licensed to practice by the bishops. Linacre died in 1524, with the stone, and bequeathed his residence to the College.

We now arrive at that period in which we have to notice the most important change in medical science, both as regards theory and practice, of any which had heretofore transpired since the origin of the art, in the formation of a sect called Chemical Physicians. At what period of time the word Chemistry was first introduced, it is impossible to tell: it appears

to be of Egyptian origin, and originally to have been equivalent to our phrase of Natural Philosophy in its most extensive sense. In time it acquired a more limited signification, and became exclusively confined to the art of *working metals.*— The founders and improvers of it were considered as the greatest benefactors of the human race ; statues and temples were consecrated to their honour ; they were raised above the level of humanity and deified.

At what period Chemistry changed this new signification, it is impossible to say. In the third century, we find it used in a much more limited sense, signifying the *art of making gold and silver.* The origin of the idea that gold could be made by art, is equally unknown. In this new sense, Chemistry, or the *art of making gold,* was cultivated with eagerness, both in Egypt and Greece, and was also introduced into the West of Europe by the followers of the Caliphs. Those who professed it, gradually assumed the form of a *sect* under the name of Alchymists ; a term which is supposed to be merely the word Chemist, with the Arabic article *al* prefixed.

The Alchemists laid it down as a principle, that the substances which compose gold exist in all metals, contaminated indeed with various impurities, but capable, by a proper purification, of being brought to a perfect state. The great object of their researches was to find out the means of producing this change, and consequently of converting the baser metals into gold. The substance which possessed this wonderful property they called *lapis philosophorum*—" the philosopher's stone ;" and many of them boasted that they were in possession of this grand acquisition.

Chemistry, as the term was used by the Alchemists, signified the art of making the "philosopher's stone." They affirmed that this art was above human capacity, and that it was made known by God to those happy sages *only* whom he peculiarly

favoured. The fortunate few, who were acquainted with the philosopher's stone, called themselves *adepti*, "adepts," that is, persons who had got possession of the secret. This secret they pretended that they were not at liberty to reveal, affirming that dire misfortune would fall upon that man's head who ventured to disclose it to any of the sons of men without the clearest tokens of the divine authority.

In consequence of these notions, the alchemists made it a rule to keep themselves as private as possible. They concealed with the greatest care, their opinions, their knowledge, and their pursuits. In their communications with each other, they adopted a mystical and metaphorical language, and employed peculiar figures and signs that their writings might be understood by the adepts only, and be unintelligible to the common reader; they even appear to have assumed the form of a sect. Notwithstanding all these obstacles, a great number of alchemistical books made their appearance in the dark ages; many of them under the real names of the authors; but a still greater number under feigned titles, or ascribed to the celebrated sages of antiquity.

The Alchemists seem to have been established in the west of Europe so early, at least as the 10th century. Between the 11th and 15th centuries, Alchemy was in its most flourishing state. The writers who appeared during that period were sufficiently numerous, and very different from each other in their style and abilities. Some of their books are nearly unintelligible, and bear a stronger resemblance to the reveries of madmen than to the sober investigations of philosophers. Others if we make allowance for their metaphorical style, are written with comparative plainness, displaying considerable acuteness, and indicate a pretty extensive acquaintance with natural objects. They often reason with great precision, though generally from mistaken principles; and it is frequently easy enough to see the

accuracy of their experiments, and even to trace the particular circumstances which led to their wrong conclusions.

The principle Alchemists who flourished during the dark ages, and whose names deserve to be recorded, either on account of their discoveries, or the influence which their writings and example had in determining the public taste, were Albertus Magnus, a German Ecclesiastic, born in 1205; Roger Bacon, born in England in 1224; Arnaldus de Villa Nova, born in Provence in 1240; Raymond Lully, born in Barcelona in 1235; and the two Isaacs of Holland, supposed to have lived in the 13th century.

The writings of the greater number of Alchemists are remarkable for nothing but obscurity and absurdity. They all boast that they are in possession of the philosopher's stone: they all profess to communicate the method of making it; but their language is enigmatical, that they may be understood by those adepts only, who are favoured with illuminations from Heaven. Their writings in those benighted ages of ignorance gained implicit credit; and the covetous were filled with the ridiculous desire of enriching themselves by means of the discoveries which they pretended to communicate. This laid the unweary open to the tricks of a set of impostors, who went about the world affirming that they were in possession of the philosopher's stone, and offering to communicate it to others for a suitable reward. Thus they contrived to get possession of large sums of money, and afterwards they either made off with their booty, or tired out the patience of their pupils by tedious, expensive and ruinous processes. It was against these men that Erasmus and Ben Johnson directed their well known satyres, the latter that entitled "The Alchymist."—The tricks of these impostors gradually exasperated mankind against the whole fraternity of Alchemists. Books appeared against them in all quarters, which the art of printing, just in-

vented, enabled the authors to spread with facility ; the wits of the age directed against them the shafts of ridicule ; men of science endeavoured to point out the infinite difficulty, if not the impracticability of the art ; men of learning showed that it had never been understood ; and men of authority endeavored, by laws and punishments, to guard their subjects from the talons of alchemistical impostors.

Alchemy becoming obnoxious and disreputable in the public mind, the alchemists determined upon turning their attention in another direction, one by which they would be enabled more securely to practice their arts and deceptions upon the public. They had long hinted at the importance of discovering a universal remedy, which should be capable of curing, and even preventing all diseases ; several of them had asserted that this remedy was to be found in the philosopher's stone, which not only converted baser metals into gold, but possessed also the most sovereign virtue ; was capable of curing all diseases in an instant of time, and even of prolonging life to an indefinite period and conferring on the adepts the gift of immortality on earth.

At this time a noted Alchemist made his appearance in the person of Theophrastus Paracelsus, who was born in Switzerland in 1493. The history of this man evinces his character to be anything but honorable ; that he boasted of secrets he did not possess, cannot be denied ; that he stole many opinions and even facts from others, is equally certain ; his arrogance was insupportable, his bombast ridiculous, and his whole life a continued tissue of blunders and vice. About the age of 34, after a number of whimsical adventures, which had raised his reputation to a great height, he was appointed by the magistrates, to deliver lectures at Basil ; but he in a short time quarrelled with them and left the city. He led a rambling life—his associates were those of the lowest order of society —he was of very intemperate habits, seldom, if ever sober.

He was arbitrary, overbearing, and egotistical, by which he obtained a great degree of influence : in fact, he appears for a time to have been the leader of the sect—the Alchemists.—As has previously been suggested, the Alchemists, despairing of ever accomplishing their object in discovering the philosopher's stone, and the general disapprobation then publicly manifested against them; unwilling that their "noble art" should sink into insignificance, or that the time and money expended in their visionary pursuits should prove unproductive, they resolved, with this notorious individual as their leader, to direct their attention to medicine : hence originated the sect called Chemical Physicians. Paracelsus resolved to subvert the doctrines, principles and theories of Galen which had existed until this period, and which had now been respected and reverenced by all descriptions of men for upwards of fourteen centuries. In one of his lectures (in order to produce effect) he burned the works of Galen before his audience, and then and there declared that if God would not impart the secrets of physic to man, it was right to consult the devil. He however alleged that he was in possession of an elixir prepared by himself, which would prolong life to an indefinite period. But neither the councils of the devil, nor his famed elixir, saved him : he died in Switzerland, about 48 years of age, amongst the lowest and most degraded company. Hence perfectly illustrating in himself the folly, presumption and falsity of his own declaration to the discomfiture of his own particular adherents. For years before his death, seldom was he known to change his clothes, or sleep in a bed. It was by the influence of this man that the then existing practice of medicine was overthrown. Previous to this time, the treatment of disease had been confined to vegetable remedies—plants, the product of nature's garden, had been the great source from which the physician derived his specifics for the cure of the various dis-

eases to which mortality is subjected. It was Paracelsus who first introduced mercury into use internally for the treatment of diseases. His reasons for so doing were, he alleged, that the human body was a compound of *salt, sulphur, and quicksilver.* This appears to have been the character of the Great Apostle of Mercury, the hydra which has destroyed the health and lives of thousands — the "beast" whom "all the world hath wandered after." We, however, find that previous to this time antimony had been used as a medicine. Its first introduction was by Basil Valentine, a Benedictine Monk, who is said to have been born in 1394, who likewise was one of the Alchemists. During his time the practice of medicine was generally confined to ignorant priests and soothsayers, who in many instances undertook to cure disease by charms, amulets, incantations, &c., pretending to have power granted them by supernatural agents to perform miracles. Basil Valentine discovered a black powder, the properties of which he knew nothing, and which in the then existing state of chemical knowledge, he was incapable of analyzing: wishing to ascertain its medicinal virtues, he gave a portion of it to some hogs which he supposed made them fat: thinking it would have a like effect upon men, he gave it to his associate monks, (but was careful enough to avoid it himself) but it poisoned the monks so they died, and hence it derived its name, antimony, or anti-monk.

The introduction of metallic agents for the treatment of disease, caused great excitement. The *regular physicians* of that day—those who advocated the Galenian system, and who employed vegetable remedies *alone*, contended with much spirit against the introduction of metallic agents, as being those which were calculated to produce much mischief: whilst on the other hand the advocates of metallic agents contended that vegetable agents were too weak and inefficient. The

whole medical world for upwards of two hundred years, was thus kept in commotion ; each assailing the other with the most vindictive and opprobrious epithets. It was in this way that the term *quackery* originated. The German name of quicksilver (mercury) is *quacksalbar*, and the Regular Physicians called all those who used quacksalbar, *Quacks*. It is true that the word at this day is diverted from its original meaning: as lexicographers now define it "it is mean or bad acts in physic"—be it so ! With this perverted definition, how many of the mercurializers are exempt from the charge ? We honestly consider it equally as applicable at this day to the same class of practitioners as it was then. In this contest, however, at length the advocates of what is termed the mineral practice, the disciples of the notorious Paracelsus gained possession of the schools, which, unfortunately for the cause of *suffering humanity*, they yet surreptitiously retain.

After the death of Paracelsus, some of his peculiar theories became more or less unpopular; yet the sect of Chemical Physicians continued to flourish with their visionary speculations and mysticism. Magic, Astrology and a belief in supernatural agencies, together with various rites and ceremonies formed a necessary part in the practice of physicians.

We cannot pass over a remarkable circumstance in regard to the appearance of several new diseases, in the fifteenth and sixteenth centuries, immediately after the introduction of metallic agents into the practice of medicine. The disease called *sudor anglicanus*, or sweating fever, which prevailed in several parts of the continent of Europe, and raged with considerable violence for upwards of fifty years, commenced about the end of the fifteenth century. In the fifteenth century the first account of whooping cough is given. The sea scurvey had never previously existed so as to render it of much notoriety; but about this time it began to manifest itself with much severity:

neither was leprosy known to exist to any extent previous to this time. The disease termed the plague, although some account is given us of its prevalence prior to this time, yet about this period developed itself with far greater fatality than at any former period. We likewise find that syphilis, made its appearance about the same time; and although, authors endeavoured for a long time to favour the opinion of its being introduced into Europe from America, by Christopher Columbus, and that other diseases spoken of, were introduced from Asia and various parts of the continent of Europe, they have since abandoned such ideas, and are satisfied to attribute it to a cause unknown in which we may concur, but not without *strong suspicions* that the true cause is not altogether so mysterious.

After the Reformation during the fifteenth century, general science as before named, continued its march of improvement, by which the writings of Hippocrates began to obtain greater repute, and a *new school* of medicine was established, called the Hippocratean; thus reviving the ancient doctrines of Hippocrates.

The sixteenth century was still remarkable for the contest existing between the Galenists and Chemists. The former were far more learned and scientific than the latter, although modern authors charge the practice of the Galenists as "complicated and inert," because their remedies were exclusively derived from the *vegetable kingdom;* and further, that their prescriptions were so multifarious, comprising so great a number of articles as to render it impossible to understand their probable operation. They are likewise charged with incorrect and unintelligible hypothesis.

The Chemical Physicians possessed neither learning nor experience, but supplied this deficiency with confidence and temerity. Their arrogant pretensions, together with cunning, and artifice, were powerful weapons against the Galenists.

They rejected the prescriptions of the Galenists, which they alleged were weak and inefficient, and made free use of the most active metallic agents, and the most powerful remedies of all kinds, which rashness was attended by many fatal results.

About this period the study of anatomy was again revived with considerable spirit by Versaleus, who was born in Brussels in 1514. He taught anatomy at Padua, and subsequently throughout Italy. He was appointed, in 1544, physician to Charles V. About the year 1564, in the midst of his professional career, an unfortunate occurrence took place which proved his ruin. He was summoned to examine the body of a Spanish gentleman, but commencing the operation too hastily, it was discovered that the heart palpitated; he was accused of murder before the Inquisition; but by the interposition of Philip II., he was only compelled to make a pilgrimage to the Holy Land. On his return, the ship in which he embarked was wrecked on the coast of Zante, where he died. There were other distinguished anatomists existing about that time, among whom were Eustachius and Fallopius, by the investigations of whom the science of anatomy acquired a far greater state of perfection than it had ever heretofore.

Fabrius, born in Italy, in 1537, who studied at Padua, under Fallopius, and whom he succeeded as professor of anatomy, first discovered in 1574 that the veins contained numerous valves, which precluded the blood from any retrograde action in them. Prior to this time many supposed that the blood in the veins ebbed and flowed like the tide, or moved first in one direction and then in another. They likewise supposed that the veins were the only conduits for the blood, and that the arteries were filled with air—they supposed that the liver, was the important organ which prepared the blood for its *transmission* through the veins. But the science of medicine derived very little advantages from their discovery.

During the seventeenth century, the doctrines of Hippocrates continued to gain ground, and the science of anatomy became a favourite study, which studies extended to every part and structure of the human body, even to the most minute vessels ; which resulted in the very important discovery of the circulation of the blood by the distinguished Harvey, which brought upon him the most unprincipled opposition from medical men, some condemning it as an invasion, and others pretending that it was known long before. By these and other despicable means, they succeeded in materially injuring his reputation and practice ; yet he lived to see the truth of his illustrations amply verified, acknowledged and adopted by the world ; and eventually, acquired a reputation which it was impossible for his enemies to subvert. Contemporary with Harvey lived Bartholine, who was the first to describe the absorbent system with accuracy. Malpighi, born in 1628, explained the structure and office of the lungs, and their relation to the heart. He was the first to employ the microscope in examining the circulation of the blood ; and authors allow him some praise for pointing out the mischief of bleeding in malignant epidemics.

About the middle of the seventeenth century, Boyle, a distinguished chemist of that age, contributed greatly to advance the cause of the chemical physicians. He introduced an elaborate investigation to ascertain the actions which bodies produce upon each other when brought into the sphere of their attraction. These investigations laid the foundation for new principles and theories among the chemical physicians ; yet many of them still continued to adhere to their fanaticism. Flood who practised medicine in England, about this time placed implicit faith in astrology. The general doctrine of the chemical physicians was that "the operations of the living body are all guided by chemical actions," and that fermentation was the chief of those actions—health and disease were both referable to certain

states of fermentation, which might be in the blood or other fluids; and the productions of those fluids themselves the result of fermentation, by which they were eliminated from the constituents of which the body was composed. Certain humours were supposed to be produced by the existence of acids, and others again by the existence of alkalies; and as the acid or alkali predominated, diseases were produced, which diseases were to be removed by a counteracting agent, as an acid or an alkali. The theory of fever was, that it originated in consequence of an excess of acidity, and hence it was supposed that alkalies were the best remedies in fever. These doctrines in a few years, became the most fashionable, both among the French and German physicians, in consequence of the influence they acquired by the writings of Sylvius at Hanan in Flanders, and Willis of England, who endeavoured to prove "that every organ of the body has its peculiar and appropriate fermentation, and that a morbid state of these ferments is the cause of all diseases." Willis was however soon eclipsed by Sydenham, who acquired the tittle of the English Hippocrates; and it is alleged "that there are various points of analogy between them, both as to general character, and as to their peculiar mode of viewing the operations of the animal frame." He agreed with Willis, that diseases originated from morbid fermentation; and with Hippocrates "that diseased action consists essentially in an effort of "*nature*" to remove some morbid or noxious cause, and that the great object of the practitioner is to assist in bringing about the proper *crisis*, and to regulate the actions of the system, so as to prevent either their excess or their defect." Sydenham with others, has been accused of adopting a practice too inert; yet it is admitted that he was an individual exercising great caution and judgment in the treatment of disease. It appears to us that he possessed no particular attachment to any peculiar theory; yet he consid-

ers the changes which take place in the fluids chemical and fermentation to be the primary cause of disease. He was an individual highly respected for his talents and acquirements by his contemporaries.

About this time, we have to notice the origin of another new theory in medicine, which gave rise to a sect known by the name of Mathematical physicians. Borelli an Italian writer of some eminence, who is said to have been a profound mathematician, which science had been cultivated with much assiduity for a length of time, wrote a work on muscular motion, in which he illustrated somewhat comprehensively the manner in which several of the functions of the body might be explained upon mechanical principles. These principles being somewhat new and novel, failed not to attract the attention of speculative minds, and in a short while the new doctrine gained many powerful adherents, especially that of a Professor at Pisa named Bellini: he extended the principle "to all the functions and actions of the body, both in health and disease;" and that all the *vital functions* could be explained upon the same principle. The converts to this theory, embraced some of the most learned men of the age. The Human Body was regarded simply as a machine, composed of a number of tubes; calculations were made of their diameters, the force of friction in them, the velocity and retardation of the fluids, and the size of the particles composing them. So general was the mechanical treatment of disease established towards the last of the 17th century, that the mechanical terms of revulsion, lentor, obstruction, resolution, &c., were almost the universal language of medical men. In consequence of the popularity of this sect, the Chemical physicians declined, and the old Galenists became nearly extinct.

The popularity which the mechanical physicians had acquired, soon became eclipsed by the appearance of another

sect, which had for some time been rising into notice, called the Vitalists. The chemical physicians finding their popularity declining, put forth the most strenuous efforts in support of their cause; and having been industriously for several years investigating the laws of chemistry, in which had been developed much important information, and in some measure freed the science from the gross superstitions in which it had been involved, they succeeded through the popularity of Van Helmont, who was born in Brussels in 1577, and who devoted the greater portion of his life to the study of Chemistry, in the establishment of their sect, (but somewhat deviating from their former principles) and of supplanting in the public mind all sther sects. Van Helmont was an ardent admirer of Paracelus, and professed himself to be a disciple of that school, whilst at the same time, he manifested a disgust against the Galenian system.

Van Helmont was a man of considerable talent and abilities, of a strong mind yet was not free from fanaticism, and was quite enthusiastic. He embraced the doctrines of the Chemists with much ardour, but contended that in addition to the chemical changes which took place in the system by its own action, and by the administration of remedies, there existed a specific principle, the definition of which it is not easy to illustrate; neither does he attempt it, and to which principle he gave the name of *archeus;* alleging it to be a specific principle independent of matter. The adoption of this principle originated the sect termed Vitalists. The term "archeus" was applied to the explanation of every principle or operation in the animal economy, which they could not comprehend. It was the cause of digestion, of fever, of inflammation, of the production of blood &c. In fact it was the principle for explaining every action of the Human Body, both in a state of disease and health. This principle has been referred to by various theorists at dif-

ferent periods throughout our history, but under numerous appellations. At this time it had in a measure been lost sight of, until thus revived by Van Helmont, by whom the foundation was laid for a theory judged the most important that had heretofore entered into the minds of medical men, (as hereafter will appear) but we in reality consider it as one the most visionary.

After the death of Van Helmont, Stahl, who was born at Anspach and graduated at Jenna, in 1684 was appointed a professor at the university of Halle, on its establishment in 1694 at the solicitation of Hoffman. He was strongly devoted to Chemistry, and the reputation which he attained in that science was far greater than that of any of his predecessors. It is said that he had great activity of mind and industry, that he was zealous and enthusiastic, inclined to fanaticism and mystery, bold confident and arrogant, fully impressed with the importance of his own opinions, and disposed to place little reliance on those of others. These principles led him to disregard and treat with contempt the usual studies of medicine, and even that of anatomy.

Stahl determined upon the foundation of a *new sect*, or rather a re-organization of the *chemical sect*, for which his character was well adapted. He therefore contended that the reasonings of neither the mechanical nor chemical physicians were capable to account for the phenomena of life. He considered all matter as passive or inert, and that it derived its power of action from an "immaterial animating principle" which he called *anima*, or the soul; which he affirmed not only originally formed the body, but is the sole cause of all its motions. He alleged that this "immaterial superintending agent" governed and directed every portion of the animal economy from its very first formation; "that it prevented or repaired injuries; counteracted the effects of morbid causes, or tended to remove them when actually present; yet that we are uncon-

scious of its existence; and that, while it manifests every attribute of reason and design, it is devoid of these qualities, and is in fact, a necessary and intelligent agent."

He alleged the office of the *anima* was to preserve the system in a perfect state of health, and the duty of the physician the mere superintendence of its actions—to co-operate with its efforts in preserving health, or to restrain or counteract its actions when irregular. He regarded diseases as salutary, and that they were the act of the soul to prevent the destruction of the body. These opinions left little for the physician to perform, but generally to trust to this superintending agent: hence although of the chemical school, he ardently opposed powerful agents, particularly mercury, opium, chincona, and very sparingly employed bleeding, emetics, &c. He considered most diseases produced by plethora; and the great and important office of the *anima* was to promote generally the evacuations in order to effect a cure. As inconsistent as the doctrines of Stahl may appear, yet we find that they gained numerous adherents, among whom were many of intelligence and influence. Contemporary with Stahl, was Hoffman, previously his colleague at the University of Halle. He was a person of a very different character, and seemed not fully to embrace the doctrines of any sect, but adopting both the opinions of the mechanical and chemical physicians to a certain extent. His practice differed little from that of his contemporaries. Hoffman ascribes to the nervous system, "operating by its own laws," many of the principles which Stahl attributes to the *anima*. He considered that in most cases, diseases had their origin in the solids.

Through a long train of years, we have perceived the general prevailing opinion to be, that the origin of disease was in the fluids under the name of Humoral Pathology. This opinion is now again to become changed, and the doctrine of Solidism

introduced. Bagliva, born about the close of the 17th century appears as the first writer who opposed the humoral pathology, although in his general principles, he adopted the opinions of Hippocrates: his writings, together with the illustrations made by Hoffman upon the nervous system, laid the foundation of the doctrine of Solidism; which doctrine, to the rejection of the Humoral Pathology, has prevailed to the present day.

The next individual we have to notice, is Boerhaave, born in Holland in 1668. He preferred Hippocrates among the ancients, and Sydenham among the modern physicians. He formed another new theory of medicine, by selecting from the various preceding theories that which he considered judicious; which being generally adopted by the chemical sect, which had become almost the exclusive sect, prevailed in Europe for nearly fifty years. He was a Chemist of considerable repute, and delivered lectures upon that science. Boerhaave adopted the opinions of Hoffman respecting the influence of the nervous system. The doctrines of Boerhaave were more fully illustrated by his pupils, particularly his nephew, Gaubius and Van Sweiten; Van Sweiten accepted an invitation to the Court of Vienna, by Maria Theresa, where honours were heaped upon him; and the high reputation which he attained, rendered his influence important in disseminating the principles of the Boerhaavian school. De Haen, who was also a pupil of Boerhaave, afterwards appointed a Professor at Vienna, opposed the use of poisonous plants in medicine. Perhaps the most distinguished of the pupils of Boerhaave was Haller, who was intended for the Church; but loosing his father, he determined upon the Medical Profession. He was appointed Professor at Gottingen, by George II., in 1736, where he was indefatigable in his labours and researches for upwards of seventeen years, and by his writings on physiology, it is stated that he dissipated the metaphysical and chemical jargon whereby it was before ob-

scured. He is said to have succeeded by investigating what is termed " the innate powers of the components of the body," in establishing his theory of " irritability and sensibility, as specific properties attached respectively to the two great systems of the animal frame, the muscular and nervous, to which, either separately or conjointly, may be referred all the phenomena of the living body." He is regarded as having introduced a new era into medical science, by his Elements of Physiology.— The controversies which arose in consequence of the theory advanced by Haller, was various and somewhat acrimonious. The most formidable of those opponents was Whytt, born in Edinburgh, in 1714, and subsequently chosen President of the College, at Leyden. He possessed considerable celebrity as a physician, and opposed the Stahlian Theory, ascribing the vital actions to the operation of *stimuli ;* so his opinions were rather a combination of both Haller and Stahl. Whytt subsequently became a Professor at Edinburgh, where it was that he had the controversy with Haller, in which he attributed the operation of vitality to a *sentient principle*, which was supposed to be something distinct from the animal frame, but at the same time necessarily attached to it. Whytt is regarded as the founder of the sect called *semi-animists, or half-animists.*

Contemporary with Haller, was Cullen, who succeeded Whytt in the Professorship of the University at Edinburgh.— Cullen was born at Lanark, in Scotland, in 1712. He had but the usual school education, and was apprenticed to an apothecary and surgeon at Glascow. Being peculiarly fortunate in his practice, and a man of talents and assiduity, he soon acquired the reputation of a teacher in medical science. In 1751, he was chosen Professor of Medicine in the University, and in 1757 to the Chemical chair of Edinburgh. Cullen is considered as a writer of brevity, which consists principally in general views and abstracted deductions, but not as " mere speculative

positions, but as the condensed result of patient research and extensive observation." It is said "that no one produced a more powerful and lasting effect upon the state of medicine, in all its branches, both theoretically and practically, than Cullen." He is said to have displayed great sagacity in the "description and discrimination of the phenomena of disease," even rivalling Sydenham, or any of his predecessors. The foundation of the pathological principles of Cullen, was "that the living body consists of a number of organs, which are all of them possessed of powers of a specific and appropriate nature, distinct from those which are attached to inanimate matter. These powers are so ordered that they have a tendency to preserve the whole machine in a perfect state, when its actions and functions proceed in their ordinary course.—When any irregularity supervenes, either from internal or external causes, if it be not in an excessive degree, the self-regulating principle, or, as it was termed the "*vis medicatrix naturæ*, would correct it, and which principle differs essentially from the archeus of Van Helmont, or the anima of Stahl, inasmuch as it is supposed not to be any thing superadded to the body, but one of the powers or properties necessary to its constitution as a living system, and the existence of which is recognized by its effects. Although the laws of gravity and of chemical affinity affect the animal body, so far as it is composed of material organs, yet its appropriate actions are under the immediate influence of the specific laws of vitality. Hence all explanations, depending upon mere mechanical or chemical reasoning, were abandoned, and in their places was substituted the vital action of the parts, and more especially that of the extreme branches of the arterial system, or as they are styled, the capillary arteries." The Cullenian school which consisted of his pupils and those who adopted his principles among the profession, continued throughout the remainder of

the eighteenth century ; and at this time a very large proportion of the medical profession both in Europe and America continue to advocate his views and adhere to his principles.

In 1765 John Brown, who was born in the county of Berwick, in 1735 became a candidate for one of the medical chairs ; but proving unsuccessful, he resolved upon establishing a new theory of vitality. Brown was originally educated for the church, and in his youth made rapid progress in the study of the languages, but changing his opinion, he devoted himself to the study of medicine. The professors allowed him to attend lectures gratuitously, and being poor he maitained himself by instructing the students in Latin: Dr. Cullen employed him as tutor to his children. It is said that some difficulty of a professional nature took place between him and Cullen, which led Brown to adopt the course which he did : be that as it may, the principles introduced by Brown, for a time acquired a considerable degree of popularity : it obtained many adherents in Europe and Italy, and was embraced by many men of learing and science, and was adopted in some of the most respectable medical schools. Brown "assumed that the living body possesses a specific property or power, termed excitability ; that every thing which in any way effects the living body, acts upon this power as an excitant or stimulant ; that the effect of this operation, or excitement, when in its ordinary state, is to produce the natural and healthy condition of the functions ; when excessive, it causes exhaustion, termed direct debility ; when defective, it produces an accumulation of excitement, or what is termed indirect debility. All morbid action is conceived to depend upon one or other of these states of direct or indirect debility, and diseases are accordingly arranged in two great corresponding classes of sthenic or asthenic ; while the treatment, is solely directed to the general means for increasing or diminishing the excitement, without any regard to specific

symptoms, or any consideration but that of degree, or any measure but that of quality." The principle producing this result, Brown attributed to caloric. Being of intemperate habits his popularity declined, and he died in London in 1786.

We now come to speak of Darwin, who was born in 173'. Darwin had studied medicine regularly as a science. He was a writer of considerable abilities, and exhibited genius and originality. His doctrines generally agreed with those of Brown, differing, however, in terms respecting the principle of vitality. The principle called caloric by Brown, was termed *sensorial energy* by Darwin. He died in 1802.

During the 18th and 19th centuries, up to the present time, we might refer to numerous writers if it would be rendered of interest, or our room permit ; yet there are some which we deem of sufficient importance, both in Europe and America, to take some notice of. In the latter part of the 18th century, medical authors seemed to have exhausted their resources in the formation of new theories, and felt little disposed to form new systems of medicine, but confined themselves more to anatomy and physiology, and to the introduction of new articles into their materia medica, assisted by the various discoveries made in Chemistry.

Among the writers of the 18th century, we find the name of Joseph Lintaud, of France, born in 1703. In 1749, he was appointed physician to the Royal Infirmary, at Versailles, and subsequently physician to the Royal Family, and Louis XVI. He wrote several works in relation to medical science. In his general principles, he maintained certain parts of the doctrines of the old Mathematicians, Humoralists and the Vitalists, to which he included the opinions of Hoffman.

Morgagni, born in 1682, and who attained the age of ninety, commenced his studies at Bologna, and completed them at Venice and Padua, is represented to have acquired the greatest

degree of proficiency in anatomy. To Morgagni is assigned the honour of perfecting what is called the anatomical pathology introduced by Bonet in Italy, during the 17th century, which was further illustrated by Valsalva, of Bologna, the preceptor of Morgagni.

Little change has taken place in medical theories since the close of the 18th century, medical men have generally considered the opinions of Cullen as orthodox, and more or less embraced them, although several writers have appeared; yet their object generally appears to have been to form systems and theories in accordance with the Cullenian School. Dr. Rush, who appears as an American writer, but who was educated at Edinburgh, was a great admirer of Cullen, adopting his *vis medicatrix naturæ*, under the name of *occult cause*, and who advocated in his publication, the use of most powerful agents in the practice of medicine, particularly blood-letting. He fell a victim to his own imprudence in this respect, in 1813. The various American Universities throughout the United States, have generally adopted the theories of Cullen and Rush, improved or modified according to the judgments of their respective Professors.

Before we close the history of medicine, in order to carry it down to the present time, it becomes necessary to take notice of an individual, who was born in 1755, at Meissen, a small town in Saxony. by the name of Hahnemann, who at the age of twenty, we find connected with the University of Leipsic, and subsequently in 1779, obtained the degree of Doctor of Medicine, at Erlangen. Not coinciding with the existing medical theories, he resolved upon adopting one more in accordance with his own peculiar fancies. In the year 1790, Hahnemann introduced his new system which he named Homoepathia (from the Greek). It is founded upon the principle that those medicines which will produce the symptoms of a

disease, should be given to cure such disease when existing, but in minute doses, and endeavours to illustrate this position, by introducing the action of mercury, arsenic, sulphur, &c., which articles, it is contended will cure where a disease exists similar to that which their application creates upon a healthy person. The system of Homoepathia, has within a few years obtained various adherents in the United States, as well as considerable influence in some parts of Europe, although there are some accounts that would go far to show its inefficiency and in which dependance cannot be placed, if we are to give due credence to Hospital Reports.

In the United States, we have likewise to notice the origin of another sect of Physicians, called Thomsonians, who date their origin from Samuel Thomson, who it appears had never studied medicine in what is termed the regular way, nor does it appear that he was possessed of even an ordinary education, but ascertaining the properties of some plants, particularly Lobelia, he commenced the practice of Medicine, with but little knowledge of the human system, depending entirely upon the energies of his own mind, which evidently was rather courageous; he accomplished that under which many would have been disheartened and discouraged. The opposition which he met with from individuals of the regular faculty was very severe, it appears he was for a long while imprisoned, and even tried for his life. None but a mind possessed of superior energy could have faced the storm of opposition with which he had to contend, and eventually has his practice been successfully and extensively established. The Thomsonian practice was originally principally confined to steaming and emetics, yet a large body of them calling themselves such, have departed in a great degree from the tenets of its original founder, and have introduced into their practice, the use of cathartics and other medicinal agents; but they contend exclusively

for the use of Vegetable remedies, and call themselves Botanic Physicians, rejecting at the same time those Vegetables as medicine which they consider of a poisonous character. They adopt the principle that "life is heat." There are other Botanic Physicians in various parts of the United States, but with the exception of the Thomsonians we have no regularly organized sect of them at present existing, with the exception of the Institution now existing in the State of Ohio, under the name of the Reformed Medical College. The Reformed Medical Society, was primarily established in the city of New-York, and had its origin with Dr. W. Beach. This Society seemed for a time to bid fair to be the pioneer to a course of practice that should eventually be of the utmost utility to the healing art: it was at this period when this school presented its most flourishing condition, that Dr. Beach published his "American Practice of Medicine," and that the establishment of the Ohio School took place, which was so successful as to obtain a Charter from the State of Ohio, and whilst that school still (as is supposed) continues its progress, the original School in New-York has ceased to exist, and its members are now private practitioners in various sections of the country. The principles and theories of the Reformed Medical Society, were in almost every respect similar to the prevailing theories of the day, or those entertained by the regular faculty, with this exception, they opposed the internal use of Mercury, Antimony, Arsenic &c., yet in some instances allowed their use externally. They were likewise opposed to blood-letting, and generally to blistering. Upon the whole, their practice was of a mild and reasonable character, with the exception of emetics and somewhat drastic purgation. Their general remedies were Vegetable, which they contended for, should be used exclusively internally, and opposed with some vehemence what they called the mineral and depletive plan of the Regulars.

Within a few years a very extensive disposition has been apparent throughout the United States in favour of a Botanical system of practice. There exists no doubt that a large majority of the people of this country, give this principle of practice the decided preference. The public mind could not thus be swayed in favour of this principle, unless there was some very essential and prominent cause. This cause it certainly cannot be difficult to trace, and were it not of the utmost importance, and the force of conviction of the strongest character in its favour, it could not have obtained the multiplicity of adherents it now can number. It is directly at variance with the long cherished opinions of Regular Physicians, which form a class in community extremely numerous, perhaps in a ratio of 20 to 1 greater than all classes of Botanical Physicians united together throughout the Union. Those men are computed to possess all the science, all the learning, all the experience. Their united influence, which they have not failed to avail themselves of, as well as to seek and obtain protection to their own peculiar systems by legislative enactments, we would suppose was of no ordinary cast.

The access which they constantly have to all classes of society—the reverence in which they are so frequently held, afford them the fairest opportunities they could desire to influence the public mind, to decry and hold up to ridicule and contempt, any principle or doctrine which they may deem proper to contemn, and which they have not failed to avail themselves of to its full extent. Every epithet which meanness and malignity could command, has been resorted to, to accomplish the downfall of the humble botanical practitioner. He is called empiric, quack, nostrum vender, &c., whilst the would-be imperative Simon Pure, lifts his arrogant head, looks wise, and with a dignified consequential air, and a scientific wave of the hand, hurls his vindictive anathemas upon the devoted head of

the poor Botanical Doctor. With all this power, this influence, and popularity, to which may be added, the entire possession of the different schools and Universities, where the popular practice of medical science is taught, and the influence brought to bear upon community through them. Under all these circumstances, is it not strange that so large a proportion of community should dare to rebel against their popular and influential dogmatical dictation. Is there not a cause? There is? But not one which is the result of prejudice. If you would find it, ask the poor cripple, hobbling about upon his wooden leg; ask the poor sufferer, whose jaw bones have exfoliated and rotted out—ask him whose body has become like a walking skeleton, who is constantly tormented with aches and pains, —who is a walking barometer, affected by every wind that blows; he who can tell you better by his aches and pains when a storm is approaching than your almanac, and then say *is there not a cause?* If the Regular Faculty consider all others as impostors, and that they and the community are imposed upon, why do they enshroud themselves in their burrow?—why do they fear to meet the light of day?—dare they discuss the subject at issue between Botanical Physicians and themselves, publicly before the people?—why evade it? they dare not do it—their craft is in danger. They say it is beneath their dignity; not your dignity gentlemen, it is your imbecility, your cowardice—you know it would be your defeat—your overthrow; your only safeguard is "keep quiet; let them alone." But how can you justify yourselves before community, to suffer such impositions which you in your wisdom allege to be false, and which the plainest of argument, if it were so—you could by your superior intelligence completely prostrate them. If you are honest men, if you have a single desire to save the people from the impositions which you allege are practiced upon them, do your duty; put them down

by fair argument—show the world the incorrectness of their principles.

We have now travelled through a long series of years, since the origin of Medical Science. To cast a retrospective view back, and collect from the various authors their various and peculiar views, can afford no particular degree of interest, nor is it of utility farther than to draw conclusions and deductions from their experience. From the very first introduction of Medical Science by Hippocrates with but little exception, the same practice has been invariably pursued. The same violent practice marks the profession at this day as then. Hippocrates bled, so do they now—he employed purgatives of the most drastic character, so do they now—he employed sudorifics and diuretics, so do they now—he used the scarifier and cupping-glass, issues, &c., so do they now—with him originated the principle of crisis in fever, which they yet retain. His success in the treatment of disease, depended upon vegetable remedies, which at the present day are at least partially abandoned and minerals substituted. This same treatment has ever since, with one or two exceptions, characterized the profession, and in those instances where an individual dared to depart from this general course, and advocate that of a milder character, he was sure to be denounced as an ignorant pretender, or inefficient practitioner. An instance of this kind occurs with Asclepiades, who practiced at Rome, about 100 years before Christ; and although his practice evinced judgment and discretion, and was of great utility, yet he could not escape the mean prejudice of those whose intelligence was far short of that possessed by this distinguished Physician. C. Aurelius who practiced in the first century of the Christian Era, is likewise condemned, because he would not resort to a more violent practice. In fact, it appears to have been the prevailing spirit which has ever governed medical men; that

where disease exists, the most violent and harsh means should be resorted to for its treatment. Not only do we find this treatment resorted to during the time in which diseases were treated by vegetable agents, but particularly more so after the introduction of mineral agents; indeed it was alleged as a reason for the introduction of minerals into practice, that vegetables, which had been the only remedies for so long a period, were too inefficient.

To review the different theories, and the different prevailing opinions which each successive theorist has entertained, would afford but little light. The successive and frequent changes which mark the course of medical science, only go to show the incorrectness of human judgment, and that in forming their respective theories, they depended more on their fruitful imaginations, than upon plainly ascertained facts, truth and experience.

My readers, however, will remark that there is one principle which appears to have been generally adopted by all classes of physicians, from Hippocrates, down to the present day, and in which they all seem cordially to agree with, under some form or other. Although this principle, like the chameleon, has changed its form or character almost every century, yet by all descriptions of physicians has it been pertinaciously adhered to. It has been the main spring, the foundation on which every system has heretofore been established, and without it has it been deemed impossible to erect any theory whatever. It was first introduced by Hippocrates by the name of "nature," which he contended influences,superintends,directs and controls all the motions of the corporeal frame, and possessed an intelligence by which it repressed those actions having an injurious tendency, and promoted those which were beneficial. Shortly after the time of Hippocrates we find the name of Esculapius deified as the God of physic, and a Temple for the worship

of this deity erected to him in Greece, and about the same time was Hygeia deified as the Goddess of health. Those deities the ancients considered possessed unbounded power over life and health, and which they continued to reverence until after the Christian era.

In the second century of the Christian era, when the worship of those deities was somewhat abandoned, again was revived the original principle of Hippocrates by the sect of physicians called Pneumatics, who maintained the opinion that the human body possessed a principle which they termed "spirits" which with the fluids and solids, constituted the composition of our system. Celsus revives the term given it by Hippocrates, "nature," and contends that fever is an effort of "nature" to throw off disease. From the time of Celsus, this specific principle, or inferior Deity, appears to have remained at rest, or the people were satisfied with it, as it was now reinstated as emanating from Hippocrates. But in the 17th century, the sect called chemical physicians, who were but the disciples of Paracelsus, possessing in truth but a small share of chemical knowledge, dared to advance the doctrine that the "operations of the human body are all guided by chemical actions," and that fermentation was the chief action. This doctrine was soon met by another from the mechanical physicians who contended that all the vital functions could be explained upon mechanical principles. But the contest between these two contending parties was placed at rest by the doctrine of Van Helmont who introduced a new name for this specific principle or deity, which he called "archeus," and alleged that its existence was independent of matter. Stahl succeeded Van Helmont, and the length to which he carried his opinions, respecting this *specific principle*, governing animal matter, was far beyond that ever assigned to any theorist or author before or since his time, to which no doubt he was led by his ambition to establish a new sect in medicine. He contended that all matter de-

rived its power of action from an "immaterial animating principle," termed "*anima*" or soul; that it not only originally formed the body, but was the sole cause of every motion, and governed and directed every action throughout life. The doctrines of Stahl prevailed until Haller after laborious investigations ascribed the actions of vitality to the operation of a "*stimuli*," which was opposed by Whytt, who ascribed it to a "*sentient principle*," and something distinct from the animal frame. Contemporary with those men, was Cullen, who introduced another term, which he calls *vis medicatrix naturæ*, differing materially from the *archeus* of Van Helmont, or the *anima* of Stahl. Cullen considered it one of the powers of the Human Body, but indefinable, and which regulated its actions. Brown, who was contemporary, attributed this specific principle to "*caloric*." Darwin, called it "*sensorial energy*." Rush, the American writer, termed it the "*occult cause*." And even Samuel Thompson, must have a specific and regulating principle, as "*Life is Heat*."

Many other writers might be referred to both in ancient and modern times, who advocated this principle with no small degree of energy as the *vital spirits* proceeding from the heart, by Culpepper. The *vital steam* from the blood, which may be distinguished by the smell on drawing blood, as named by North an American writer who wrote a small treatise a few years ago. Broussais, a French writer, named it *vital chemistry*—Chapman and Hunter term it *vitality*—Combe, Good, Eberle, Turner, Armstrong, Dewees, Gregory, Thatcher and Thomas call it "*living principle*," and "*living powers*," and "*powers of life*"—Hooper, in his Medical Dictionary, terms it the "*vital principle*."

It is here perceived that a certain principle having its rise and origin in the grossest superstition and ignorance, has ever been the leading principle and foundation stone of all Medical

Science, and which it still retains with an obstinacy that bears no parallel. This opinion has not only passed current with all description of educated and learned physicians in all ages since the estalishment of medicine, but with learned and scientific Philosophers. It has always been that accommodating principle to which they could refer, and thence account for every transaction or circumstance, which they were incapable of comprehending. But these learned authors cannot agree at all in relation to this "Vital Principle," only on the circumstance that it does exist. In order that the reader may more fully comprehend the opinions entertained upon this subject at the present day, we will here quote the language of some of the most reputed modern professors. N. Chapman, M. D. Professor of the Institutes and Practice of Physic, and Clinical Practice in the University of Pennsylvania, President of the Academy of Philadelphia, &c. &c., published in 1823 a work called Elements of Therapeutics and Materia Medica, in which, under section first, he gives us the following view of this "*Vital Principle.*" "Of the various doctrines of Vitality, one only appears to me to be well founded and consequently deserving attention. It presumes, that every animated body, animal or vegetable, is endowed with a *primordial principle of life*, which resident in the egg of animals, and the seed of plants, constitutes the power by which, in the first place, the various organs are moulded, developed and perfected, and by which afterwards, the animal economy is defended against the Action of Mechanical and Chemical laws. Located perhaps in the highest degree among the digestive and assimilative organs, it enables them to change or destroy the qualities of the substances exposed to their operation, without sustaining in return the slightest injury or change. It would hence really appear, that instead of matter, whether aliment, drink or medicine acting on the living system, as is commonly imagined, it is, on the

contrary the living system which operates on these matters." In the first instance the doctor frankly admits the disagreement among physiologists respecting this principle, but like his predecessors he cannot but pay due homage to the idol and illustrate it in his own way, which by the by, exhibits no peculiarity of difference from that originally entertained. He calls it a "*primordial principle of life*," what it is, he does not pretend to tell, but attributes to it the most extensive and unlimited powers, first producing life, moulding and perfecting all the organs of the human body, and afterwards defending them both from the action of mechanical and chemical laws. It would indeed be a happy thing for mankind if this were true; no poison could effect us, we could sustain no injury under any circumstance whatever. It would have been well if this specific deity had not so far forgotten its duty as to have been present and saved the lives of the thousands who fell on the fields of Waterloo. The doctor goes on and supposes it to be principally located "among the digestive, and assimilative organs," and draws the conclusion that the effects produced by food, drink or medicine, is not produced by the action of those articles upon the system, but the several organs acting upon the substances introduced into the stomach, by the ability furnished these organs by this vital principle, this opinion would be in perfect accordance with his first position. In the course of a few sentences the doctor again refers to this subject, in which he confirms the opinion which he has above expressed in the following language:

"To me it is clear that the progress of assimilation, as performed either by the chylopoietic viscera, or by any part of the absorbent apparatus, completely decomposes all substances —and however discrepant in their properties, reduces them to a homogeneous fluid, fitted for the purposes of nutrition, but when thrown into the secretions or excretions, being removed

beyond the controul of the vital energies, chemical affinities, are sometimes again brought into play, by which these substances are in part or wholly regenerated." We cannot but admire the inventive genius of the learned Professor. Arsenic, corrosive sublimate, or the most corrosive poison, can do no mischief to the digestive and assimilating organs because it is the seat, the throne of the vital principle, and by which power all substances, as discrepant as their properties may be, are decomposed and reduced to a homogeneous mass, fitted for the purpose of nutrition. If this were true, sawdust, clay, &c. would be as fit for food as anything else. But when thrown into the secretions or excretions, says our author, they are beyond the controul of the vital energies, and then by chemical affinities, the original substances may again be regenerated.— These doctors are strange folks. Perhaps this is the way in which they account for the discovery of quicksilver in some parts of the body after death.

Dr. Hooper, in his Medical Dictionary, adopts the doctrine, that the vital principle is diffused throughout the fluids and solids; and further observes, by the aid of this principle "nature produces the animal fluids, as blood, bile, &c." But "if," says he, "in consequence of death, the laws of vital attraction or affinity cease to operate, then the elements, recovering their physical properties, become again obedient to the common laws of chemical affinity." What does Dr. Hooper mean? Does he intend to say that death kills this vital principle? and that, that is the cause why life ceases to exist? We have always been led to suppose that death took place in consequence of the organs essential to the preservation of life, and necessary for its support, becoming incapable of performing their requisite functions.

Some writers locate this principle in one organ, and some in another, scarcely any two of them agree in this particular, ex-

cepting its existence; they all feel the utmost confidence; so strong are their prejudices wedded to this opinion, that there are those among them who would not hesitate to charge him who would even suggest the possibility of a misconception in relation to it, with arrogance and presumption; nay even scepticism and infidelity, when in truth the contrary would be more in character and justifiable. Of its office, and of its powers, they can discuss and reason learnedly and wisely, but what it is, they all allege they can know nothing—they say it is neither material nor immaterial—that it is neither matter nor spirit; with the single exception of Stahl, who contended that it was the human soul, which all authors since his time have utterly disavowed, and very justly too. Such an assumption could have only been the result of the grossest ignorance and presumption. To define the properties of an immortal soul, we must be placed in a situation to fully comprehend things immortal—to comprehend and understand that which in a state of mortality cannot be cognizable to any mortal sense. It is that which no philosopher or divine has hitherto attempted.—And were we to so determine, what inextricable difficulties should we soon be placed in. If we are to take it for granted, and consider and believe that all the motions, actions and performances of the human body, both in disease and health, are chargeable to the soul, and as motive always precedes action, motive must be likewise an act of the soul, consequently, we should be seriously at a loss to conceive how the transactions of the body could ever be wrong, as the will of the soul was paramount to the body, and the body compelled to be obedient to its will. Such an opinion we can view in no other light than contempt, as it is calculated to favour the opinion of the soul itself being impure when first issuing from the hands of the Creator!

This principle had its origin in idolatry and superstition at a time when the world was in a great degree enshrouded in mental darkness, at the time when the people bowed to idols erected by their own hands and superstitious fancies. The heathen had a specific deity created by their own imaginations to govern every matter, circumstance and thing. Thus they had a deity which they called "Mars," the God of War; "Vulcan" the God of Subterraneous Fire; "Pluto" the God of Hell; "Neptune," the God of the Sea; "Mercury," the God of Eloquence, Merchandize, and Robbers; "Vitula" the Goddess of Mirth; "Vesta," the Goddess of Fire; "Venus," the Goddess of Love, Beauty, &c.; "Rumina," a Goddess of new-born Infants. "Pales," the Goddess of Shepherds. These deities the ancients supposed possessed unlimited powers over every principle or thing, which these specific deities were supposed to govern; and hence, they considered it imperatively necessary that they should have a specific deity to govern medicine, and the name Esculapius, received the cognomen of God of Medicine, and the names of Hygeia and Palis, the Goddess of Health. Here, then is the foundation and germ of this vital principle, which has undergone so many changes and transformations, but has continued to be the cherished idol of the Medical Profession.

It answers a very important purpose, for an inanimate machine, as a locomotive, &c. that an individual direct, manage, and control it—it is necessary, but when we come to apply it to the human body, it presupposes that the Great Jehovah was incapable of so organizing laws, that would produce and maintain life, without placing in every human body, a little inferior deity, to superintend and regulate its actions—and the office of this little fellow, or little indefinable something, was first to run from one organ and then to another, to see how each performed its duty, and if it got tired,—refused to work,

or forgot its business, death followed. The very idea is preposterous: the doctrine in itself is no other than an inferior deity usurping the place of a superior deity. It is the common error of the science of Medicine, and the rock upon which all former systems have split, and upon which all present systems must soon be wrecked. It is this false system, that has retarded all advancement in Medical Science, turned aside investigation, and left the principles and practice of this science at least a century behind the "intelligence of the age."

An important doctrine connected with this theory of vitality, is the metaphysical chimera of *sympathy*, which supposes that a given medicine produces specific impressions, or action upon the stomach or organ to which it is applied—which impression is thence conveyed "through the medium of sympathy," to other and remote parts; the action produced, being the same wherever there is similarity of structure, yet differing when extended to dissimilar structures. This theory presupposes that remedial agents act primarily upon the solids, and that the changes in the fluids are produced by the action of the solids. But the very reverse of all this, is the fact, in truth it leads to thousands of other discrepancies, which will appear more fully in the issue.

We here pause, and cast our eye back upon preceding generations; picture to our minds the many reputed distinguished individuals and philosophers, who have written largely and learnedly upon this subject, who even are reverenced by those computed the most learned and intelligent men of the present age, we find them all without an exception, unhesitatingly and confidentially embracing the doctrine of a specific vital principle, separate and apart from the Laws of Nature; which vital principle, they allege performs all the offices in the human system necessary to vitality. We reason and reflect, can this be so, or is it only to be found in the brains and books of

authors, is not a mysterious *humbug*, and only calculated to blind and bewilder the student of medicine—to arrest free inquiry—free investigation—to arrest the onward march of Medical Science, and prevent it ever attaining that eminence, correctness, and simplicity of which it is so susceptible, and to afford the ignorant professor a refuge to flee to, whenever his prescriptions produce effects different from what he expected or intended. We have weighed this matter well; we have studied and reflected upon it deeply; we have brought our whole reason and intellectual faculties to bear upon it, with due respect and consideration to the opinions and views of the various scientific writers upon the subject. To this subject we have devoted the greater attention, it being the main foundation stone of medical science, that upon which every medical theory, structure and doctrine has heretofore been based and erected. We have deemed that it might be considered the height of presumption in us to even deviate in the smallest degree from this universally acknowledged hypothesis. But whilst we are thus poised between imagination and evidence, truth and error, we boldly determine, let consequences be what they may, though we be called fool or idiot—theorist or visionist, to *absolutely disclaim the existence of any such principle as that advocated by Medical Philosophers whatever;* and that the introduction of such principles into Medical Science, can serve no other purpose, than greatly to retard the progress of true science and render the existing ignorance respecting the healing art still more dark and obscure. We have taken our position and stand ready to support it, against the sophistry and arguments of both ancient and modern theorists, and not only so, but we challenge its refutation by the most learned. The adoption of this principle, has given rise to the opinion that the practice of medicine could never be any other than empirical, for this reason, as it was impossible to know what this specific principle

was, and as it was this principle that performed every action, both as it regards the mechanical actions of the body and the involuntary acts, and likewise upon food, medicine, &c., every thing taken into the stomach, the circumstances being such as to render it impossible to ascertain its properties, it was alike impossible and would ever necessarily remain so, to ascertain what the direct action of any agent could be, unless by a trial, and even then it may be found to act differently at one time from what it would at another. In other words any thing taken into the stomach, which this Vital Principle was not pleased with would produce mischief; but if it happened to be pleased with it, the action would be beneficial; and even then, sometimes from its peculiar fancies, or in one of its freaks, it would act somewhat contrary to its general course and so disappoint the expectation of the physician! What nonsense!—Has common sense become totally extinct? and do we now live in the age of the grossest and worst idolatry and superstition?

Having, not only abandoned the idea of the existence of any such principle, but both directly and indirectly utterly denied the existence of any *specific vital principle* whatever, in what situation have we placed ourselves? How are we to account for vitality, the various principles by which the whole organization of the human frame performs its various offices? How are we to account for that state of existence called life? Why is it that the lungs inflate? Why is it that the blood becomes changed in the lungs? What that change is? What power induces the heart to propel the blood through the system? How is it that the bones, muscles, ligaments, cartilages, nerves, &c., obtain their support from the arterial blood? and why it is that they abstract from the blood, only that part or constituent of the blood which they require for their support? How is it that digestion, assimilation, &c., are performed? What office do the various fluids perform? What power is it that governs the peristaltic motion of the bowels, &c. &c.?

We shall illustrate these principles upon entirely different grounds, and in that way that shall render it perfectly intelligible to every mind, who is sufficiently acquainted with the existing and not unintelligible laws of nature. They will plainly comprehend cause and effect; and the principles in themselves are reasonable, rational and comprehensive;—against the truth of which as I have before said, I challenge refutation. That a power superior to mortality, has originally directed organization, I have no disposition to deny—that has orignally constituted matter, or the elementary principles of matter capable of organization is equally evident, which laws when once instituted, once in action, preclude even the necessity of further action or direction. Those laws are the laws of nature, and are always uniform and forever unchangeable. No action can possibly take place except in accordance with the laws of nature,—there can be no other.

Genius and talent have expended their time and energies not to develope truth, but in endeavours to demonstrate the errors of each other.

The Human body is constituted of those same principles of matter which surround us, which comprise and are found in the world of inert matter, (if any thing may be termed inert,) and from which it is directly or indirectly drawn, and back again to which all the variety of matter, forming the human system or otherwise evidently must return. A knowledge then of the constituents and properties of this matter, must therefore be of the most vital importance to the practitioner of medicine.

To pursue the practice of medicine and at the same time be ignorant of the principles from which matter originates, the laws by which matter is formed, the changes to which matter is liable, the actions to which under various circumstances it can be subjected: in fact, all laws by which all matter is first organized, afterwards governed, and the principles again producing

its decomposition, by which it eventually is returned to its primary constituents, should be fully known, comprehended and understood.

This knowledge is indispensable as it regards animal matter, the human body, and without which it is utterly impossible to treat disease upon correct principles—without this knowledge medical men must, like the mole, grope in the dark ; or, as the distinguished Dr. Hunter observed, when he could not understand the disease to which he was called to administer, "we will fire into the tree, and see what falls," which induced a wag to exclaim, "it was the patient which he too often made to fall." This knowledge would enable the physician to direct his prescriptions with a certainty which otherwise it would be impossible, and even if he did not succeed in effecting a cure in some cases, he would have the satisfaction in knowing that his prescription produced no injury. I am aware that my opponents may say "Do we not study and teach the science of chemistry ? Have we not Professors of Chemistry in all our institutions ?" Suppose you have, when and where have they directed their attention to organic chemistry ? Has it not been declared utterly unnecessary to enter into an investigation of the chemical constituents of animal matter, from the invariably received opinion among medical men, that disease or health did not depend upon any law of chemical attractions or affinities, but upon what they ignorantly called vital laws, and vital affinities, a term which in fact it is impossible for them to ascribe any meaning to whatever.

It may be said that the principles which I advocate have heretofore engaged the minds of physicians, the ancient chemical school, and were found untenable and incapable of explaining the existing phenomena with which life is environed. From such, gentlemen I beg leave to differ.

The nearest approach which has ever been made to the discovery of those principles by which life is produced, sustained, and supported, was at the time when the contest existed between the chemical and mechanical physicians. At the very moment when the principles of life were about to be explained, the aristocratical and dogmatical Stahl siezed hold of this important principle in science, and carried it back again to the dark ages of superstition.

The present is an age of investigation. The public mind begins to awaken to its necessity. Subjects but a few years ago considered the most mysterious, and shrouded in impenetrable darkness, begin now to open their rich treasures to the enquiring mind—superstition and ignorance are fast fading before the brilliant sun of intellectual power. People begin to think for themselves, and to investigate cause and effect. We cannot but hail with the sincerest heartfelt pleasure, those happy combinations of circumstances which have contributed to this result, and look forward to that period of time when the brilliant meteor of science shall so illumine the world as to render all that has heretofore been clothed in mystery, plain and comprehensive to the most imbecile understanding; when war and bloodshed shall no longer be the medium for adjusting existing difficulties, but general intelligence render them few and rare, and satisfactorily adjusted alone by the intellectual faculties of man.

In our introduction of new principles in the science of medicine, we have been told that we are in advance of the age; that the time for their reception has not yet arrived; the powerful opposition with which we should have to contend, was such as would effectually put to flight all our puisne efforts. To their statements we answer, that but a partial reception will in a measure pave the way at this period to a more speedy developement of the true principles of medical science;

and further, we cannot bring our minds to conclude that the whole and combined influence of the medical faculty, can so far succeed by creating prejudice sufficiently strong against us at this day, remarkable as it is for the diffusion of important knowledge, to render our efforts entirely abortive. We stand ready at any time, orally or otherwise, to discuss the subjects at issue between us, if they dare.

In order that the common reader may more fully comprehend the doctrines which I am about to advocate, it becomes necessary for me to illustrate some important principles in detail. As I have previously contended that all matter derived its existence from the gases of the atmosphere by which we are surrounded, and particularly vegetable matter, from which animal matter was formed, it is somewhat incumbent upon me to show how it is that this formation is produced, and at the same time, the reader must bear in mind that I have likewise shown that the great and grand agent engaged in effecting this work, was *Electricity.*

We recognize in our mind the smallest infant ; years pass on and it arrives at the state of manhood, strong, powerful and athletic, completely organized with bone, muscle, sinew, ligament, &c., all adapted for the purpose of locomotion ; with brain, nerves, &c., fitted for all the purposes of sensation, both of pleasure and pain, the exercise of reason, reflection, judgment, calculation, foresight, &c.

To the reflecting and enquiring mind, the question naturally arises how, by what means, and by what powers is this event brought about. Nature has kindly organized us with an important organ termed the Stomach, which is the first great enlargement of the alimentary canal. It lies nearly horizontally across the body, the large end lying on the left side, thence passing under the liver until it reaches near the centre of the body, terminating at what is called the pyloric orifice, which in the usual language, is called the "pit of the stomach."—

This part of the intestinal canal, is formed by a strong band of circular fibres, which have the power of contraction, which together with a small valve, close the canal, and thus prevent the food or chyme from returning again into the stomach, after having passed the pylorus. After the food is masticated and mixed with saliva in the mouth, it is conveyed into the stomach, where it meets with an important fluid called the *gastric juice*, which is secreted by the mucous, or lining membrane of the stomach. This fluid, the gastric juice, possesses the property of dissolving the food into very minute particles, whilst it remains in the stomach, although there are some articles, as seeds, &c., which the solvent powers of the gastric juice are frequently not sufficiently great to dissolve, and therefore pass through it unchanged. When mastication has been imperfectly performed, and the food not sufficiently divided, the action of the gastric juice, cannot prove so effectual in performing its office, and would require a longer period of time to effect its dissolution, in consequence of thus being deprived of coming more immediately in contact with the whole portion of food. Its retention by this means in the stomach, might create more or less irritability or sensations like a heavy indigestible load in the stomach. After the food has been sufficiently acted upon by the gastric juice in the stomach, it passes from the stomach through the pyloric orifice into another portion of the alimentary canal called the duodenum or small intestines, which are situated immediately below the pit of the stomach, and to which they are connected by the pylorus. The duodenum is the first part of the small intestines, and its length is about the breadth of twelve fingers, and is that portion of the intestines, where chylification is performed. The second portion of the small intestines is called the *jejunum*, which commences where the duodenum ends, it is generally found empty, but is every where covered with red vessels. The *illum* is the third por-

tion, but is of a paler colour than the jejunum, and terminates in the large intestines by a strong valve.

In the duodenum, the food or chyme so called, is likewise acted upon by the pancreatic juice, which is secreted or formed from the pancreas, which is situated under the stomach, of a fleshy consistence, long shaped similar to a dog's tongue. It is composed of a great number of small glands and ducts, which unite and form a large duct, called the pancreatic duct, which enters the duodenum, into which it conveys the pancreatic juice secreted by the pancreas. When the food in the duodenum is acted upon by the pancreatic juice, the office of digestion is then completed.

The duodenum likewise receives another important fluid, the bile, secreted by the liver, which is conveyed from the gall bladder, which is situated upon the under surface of the liver, and from which it is conveyed through the bile-duct, a tube about the size of a crow-quill, into the duodenum. Medical authors invariably have contended that the bile performed some important office in digestion; that it was the "natural purgative," and that its presence was "highly necessary to quicken the motion of the bowels," and further, that "when the bile is vitiated in quality, or increased in quantity by disease, it often acts with violence, producing severe and even dangerous purging, and when it is greatly diminished in quantity, obstinate costiveness is the ordinary consequence." This doctrine we may agree with in part; but from far different reasons than are here intimated. That the bile performs any office in digestion, we totally deny. Every analysis of the bile that has hitherto been made, proves it to contain even a free alkali, of the truth of which our own analysis has fully satisfied us. We allege that the only office destined for the bile to perform in the animal economy, is the separation of the chyle from the chyme, or the nutritive part of our food from the ge-

neral mass. We admit that the bile may become of an unhealthy character in two ways, and thus become incapable not only of performing the office destined to it, but may likewise be rendered capable of much mischief.

If in consequence of torpidity or sluggishness of the liver, an inordinate retention or accumulation of bile, took place in the liver, gall-bladder, or bile-duct, the bile would necessarily become of a thick and viscid character, which circumstance is not an unusual occurrence, giving rise to the formation of biliary concretions, as gall-stones, &c., which accumulate in the parts, producing much distress, and sometimes even terminating fatally. This thick, viscid secretion of bile, would produce costiveness; and the more viscid the bile, the more obstinate would be the constipation. This thick state of the bile would soon be followed by a thin and acrid secretion of bile, in consequence of the necessary decomposition which it is constantly subjected to. This thin and acrid state would soon be followed by the disease called bilious diarrhœa, which so frequently occurs in warm climates, or in warm seasons of the year, when decomposition is carried on with the greatest rapidity. Even the black vomit in yellow fever, is but a still further decomposition of the bile. In no other way is the bile concerned in the transactions of the alimentary canal. As to its being the "natural purgative," we know not how to reply in more appropriate language, than by saying it is the *unnatural purgative*. That the bile governs the peristaltic motion of the bowels, is far from correct; and evinces a want of knowledge in the principles of physiology; it would be equally as inconsistent to say that the gastric juice produced nausea of the stomach. The peristaltic motion of the bowels, as well as all the other excretions and secretions, are governed by a far different cause than this, as will by and by appear. If "obstinate costiveness" is produced in consequence of the bile being

"greatly diminished in quantity," why is it that in the summer complaints of children, and many other cases of diarrhœa, the fœces present scarcely any appearance of bile whatever? and how will gentlemen account for the fact that alkalies relieve diarrhœa, and that acids both produce and aggravate it. Are not alkalies an artificial supply of bile? and do not acids decompose bile? Learned authors may find fault with me for contending against this universally maintained opinion; but they contend against a truth which they will find it no easy task to subvert.

The chyle being separated from the chyme by the bile with which it unites in the alimentary canal, is then a fine, bland, milk-like substance, and contains that nutritive part of our food designed for the constant support of the whole system. Nature has then again kindly organized us with a numerous set of small vessels, which are termed lacteals, or absorbing vessels, containing a large number of valves, which reach the alimentary canal throughout its entire course; but more particularly the small intestines, and in far greater number, in that portion of it called the jejunum, where the lacteals are found much distended with chyle an hour or two after eating.—These small vessels, the lacteals, absorb the chyle, the nutritive part of our food, from the intestinal canal, and carry it to the thoracic duct, or trunk of the absorbents, an organ of a serpentine form, about the diameter of a crow-quill, and lies upon a portion of the spine called the dorsal vertebra, between the aorta, or great artery; and the anzygos vein, situated at the right cavity of the thorax. The thoracic duct communicates with the venous blood at the junction formed by the union of the left subclavian and jugular vein, into which the thoracic duct evacuates its contents. The chyle thus unites with the circulating mass of venous blood, and is carried to the heart. The heart is a powerful, muscular organ, situated on the left

side of the chest, enclosed by a membrane called the pericardium, in form like a bag or sack, which always contains a liquid for the lubrication of the heart, and prevent friction, and give the heart free play. The heart has its four apartments : its right ventricle and left ventricle ; its right auricle and its left auricle. Many consider it of the character of a double heart, or two hearts, and which idea cannot be said to be inconsistent considering their distinct adaptation, and uses of both portions of it. The blood which circulates in the veins, is received into the right auricle of the heart from the descending and ascending *vena cava*, which are large veins, and receive the blood from all parts of the body. The right auricle, becoming distended, contracts and throws the blood into the right ventricle, from which through the pulmonary artery, it is thrown to the lungs at every pulsation of the heart.

In the lungs the blood meets with a very important change. Whilst it passed through the veins to the heart, and whilst passing through that organ it was of a dark character, but the instant it enters the lungs, its dark appearance is changed to a light or florid red. Hence it is often inquired in cases of hemorrhage or bleeding, or spitting of blood, what was the colour of that blood?—it was dark; then it was not from the lungs—but if it was light, then it was from the lungs. This altered appearance in the blood evinces that some change has taken place in it. What was that change?—at every exhalation from the lungs, carbonic acid gas is disengaged, (why this is so, we shall explain when we enter more fully into the subject,) and at every inhalation, oxygen and electricity are absorbed from the atmosphere. When this change has taken place in the lungs, the blood is again returned from them by the four pulmonary veins to the left auricle of the heart, and from thence evacuated into the left ventricle, which contracts, and throws the blood, (now called arterial blood,) through the

great aorta to every portion and part of the Human Body. This arterial blood eventually reaches the capillary vessels of the skin, and mucous membranes in every portion of the body, which are very small blood vessels, and extremely numerous, so numerous are they, that you cannot place a pin where they are not. From those capillary vessels, the blood enters the veins, smaller veins entering larger trunks, until that blood receiving the chyle from the thoracic duct in its course, is again conveyed to the heart, to be thrown to the lungs, there to be similarly acted upon, and for a similar purpose. From this arterial blood, every portion and part of the human body is formed: it contains the constituents for the formation of muscle, bone, cartilage, ligament, membrane, &c., and from which arterial blood, all portions of the body are constantly supplied. Thus, is perceived the manner in which animal matter, is the product of vegetable matter; the vital organs and the means by which vitality is supported. I am aware that the theorists of a specific vitality, will avail themselves of the opportunity here offered them to enquire—how do the bones know that they should absorb phosphate of lime from the blood? who told the nerves what specific fluid they must absorb from the blood? If there be no specific agent governing animal matter, upon what principles can this result take place? The asorption from the arterial blood that article, and only that specific article, and in the requisite proportion, demanded for the supply of the organ requiring it? Does this enquiry potent as it may appear, prostrate our whole fabric? Must the *ingenious* principles which we have so ardently endeavoured to illustrate, be forever annihilated at a single blow? Stop sirs,—not quite so fast; cast your eye back upon a few preceding pages, and the mystery will be explained; how it is, and why it is. Have we not shown that the principles of Electricity governed and pervaded all matter? and does not the arterial

blood return from the lungs highly charged with this important principle ; and is not that matter highest charged with it attracted to a body less charged with it? There is no mystery in this, is there? But I will be asked again, why is it that each organ receives from the blood only that requisite or certain proportion required? Why do not larger accumulations take place in the various organs? To which, we reiterate, " that electricity, like all other fluids, seeks its equilibrium ; and when that is effected, attraction ceases. It must likewise be born in mind that the solids are constantly wasting as well as forming. Gentlemen, are you answered?

We shall now proceed to illustrate in some measure the chemical constituents of the fluids and solids of the human body ; but as we do not calculate on the present occasion to enter into extensive details, our remarks must necessarily be concise and embrace the whole principles relating to the subject as far as possible. We shall confine ourselves to such as have heretofore been examined by various individuals, and such as we have found by our own experiments, to prove correct. It is not our design in the present work to introduce those which we ourselves have made ; our object being to show conclusively that sufficient on that point had previously been ascertained (had a proper application been made of the discoveries) to satisfy any mind ardently devoted to the principles of treating disease. In a future publication, we shall give a complete analysis of all the fluids and solids, as examined by ourselves, as well as extensively illustrate the specific action, or *modus operandi* of all the medicinal agents, both mineral and vegetable, which are now, and may hereafter form very important articles in the cure of disease. As to mineral agents or metallic agents as they are sometimes called,we altogether object, they are inappropriate, they are inconsistent, they are injurious, they are incompatible with the animal economy, as will hereafter be illustrated and explained.

In illustrating the chemical constituents of the human body, we intend to show in a measure the reason, why and how they become composed of the specific materials of which they are composed, and from what source derived. This illustration we believe has never been made before, but which is absolutely necessary for a true understanding of the science. To know from what sources the bone is formed and from whence it obtains the materials for its formation, and by what means the whole process is effected, are certainly matters of great moment to the individuals who anxiously seek to practice the healing art upon scientific and practicable principles, and not only the bone, but the original and primary source, from which every fluid or solid is formed, and the nature of the process required for their completion.

The bones are those hard or most solid parts of the body, which are generally said to constitute the frame; they give shape to the body, firmness and strength, somewhat insensible, and of a whitish colour. They vary in their appearance: some of them being long, hollow and spongy; others flat and compact. The human body has frequently been subjected to analysis. In 1771, Scheele, a distinguished Chemist, ascertained that the earthy parts of bones were comprised of *phosphate of lime.* This appears to have been the first step in ascertaining the chemical constituents of bones. New facts respecting their composition have subsequently been illustrated by Bouillon, Berniard and Rouelle; but Fourcroy, Hatchett, Vauquelin and Berzelius, have given us the most correct analysis which has heretofore appeared. The principal constituents of bones are earthy salts, fat, gelatin and cartilage. The earthy salts (so called) are phosphate of lime, which is by far the largest constituent, or greater portion of the whole; carbonate of lime, and Fourcroy and Vauquelin, discovered phosphate of magnesia in them. Yet they allege that the latter ingredient

they could not detect in human bones; but Berzelius announces his discovery of it in them. Mr. Hatchett detected sulphate of lime in a minute proportion in them; but Berzelius shows that it was produced during calcination. The only bone found to contain no cartilages, is the enamel of the teeth. Fourcroy and Vauquelin show that the enamel of the teeth are composed of 72. 9 of phosphate of lime, and 27.1 of gelatin in 100. But the most accurate analysis heretofore made of the enamel of the teeth was by Mr. Pepys, which exactly agree with that made by Hatchett, and shows it to be composed of phosphate of lime, 78; carbonate of lime, 6; water and loss, 16 in 100 parts.

I will here introduce a table, showing the analysis of teeth as made by Mr. Pepys; by which it will be seen that the teeth contain more phosphate of lime, and less cartilage, than bone; and the enamel more phosphoric acid than the teeth.

	Roots of the Teeth.	Teeth of Adults.	First Teeth of Children.
Phosphate of Lime, -	58	64	62
Carbonate of Lime, -	4	6	6
Cartilage, - - - - -	28	20	20
Loss, - - - - - - -	10	10	12
	100	100	100

The most correct analysis of human bones, which we have hitherto met with, was made by Berzellius, which show their composition to be 71.9 phosphate of lime; 3.0 fluate of lime; 10.0 lime; 1.1 phosphate of magnesia; 2.0 soda; carbonic acid, 2,0 = 100.

Thus we are led to discover that the constituents of all bone, both the teeth and bones of the body contain a larger proportion of phosphate of lime than of any constituent of which

they are composed; and by the analysis of the bone we perceive even free soda and lime to exist in it.

Phosphoric acid with lime, form four different species of this salt, by uniting with the lime in different proportions; thus, we have the phosphate, biphosphate, quadriphosphate and subphosphate. It is the phosphate which forms the basis of bones. When bones are divested from extraneous matter, by calcination and purification, they are a white powder, which is pure phosphate of lime, destitute of taste, insoluble in water, and not liable to be altered by exposure to air, and is capable of being exposed to a strong heat without undergoing change: but if the heat be extreme, it becomes soft, and is converted into a white, semi-transparent enamel, not unlike porcelain. Several experiments have been made to determine the constituents of this salt, the most accurate illustrate its composition to be 100 parts of phosphoric acid, to 84.53 of lime.

Hence we have evinced to us that the far greatest constituents comprising the human bones are phosphoric acid; even this acid exceeds the lime. The inquiry at once arises, from what source does the bone derive this phosphoric acid and lime? or is it by any power or action of the laws of nature formed in the human body? We must here again call the attention of the reader to the fact that "animal matter is the product of vegetable;" that the constituents which exist in vegetable matter form animal. But do vegetables contain phosphoric acid and lime? They do! What vegetables? Phosphoric acid is found uncombined with any alkali whatever in various plants, as the onion, mullein, &c. But in combination with lime phosphoric acid exists in abundance in a large number of plants. Bergman found it in *all* kinds of grain. In barley and corn, it is said to be combined with potash; but I suspect they confound it with phosphate of lime. From this

explanation, it is not difficult to perceive from what source we derive the constituents for the formation of bone, as we must necessarily constantly be receiving into the system, a full supply of it through the agency of food. All animal food must likewise constantly comprize large proportions of it. Thus it is that phosphate of lime is constantly found in the blood, which when taken up from the blood, forms the specific matter which forms the bone.

We shall now enter into a more detailed illustration of the formation of bone. We have but examined its constituents as they present themselves, when completed or perfectly formed. In the infant, we find that part destined to become bone, is of a soft and cartilageous character; and that it requires a certain process to take place for some length of time before the formation of bone is perfected. Physiologists have materially differed in their opinions respecting the formation of bone: those of the present day assert that it is from a specific action of small arteries, by which ossific matter is separated from the blood, and deposited where it is required. What this specific action is, they do not pretend to tell; but the reader before this time must be aware, that such specific action takes place by that principle already illustrated, *attraction.* In embryo, in such parts, where bone is to be formed, the first appearance which we perceive is a transparent jelley, which gradually bocomes firmer until at length it is formed into cartilage which gradually increases in size, and ossification or the formation of bone gradually commences which progresses to its completion, which is not till about the twentieth year. Now the question arises, how and by what means is this result brought about? From whence did this transparent jelley arise?—Why was the cartilage formed, and how is it that cartilage is formed into bone?

In giving our history of the formation of bone, we perceive the first formation to be a transparent jelley. That all vegetable productions contain more or less jelley none will venture to deny, and in many cases constitute an important article of food, it cannot be considered strange that it should be one of the constituents of animal matter; it is of tremulous consistency scarcely soluble in cold water, but freely in warm; if long boiled, the property of gelatinizing, on cooling is lost, and is then of the character of mucilage. When jelley is dried, it becomes a transparent, brittle, mass, possessing the properties of gum. Jelley has the property of combining readily with alkalies, particularly soda, and thus forming albumen, the constituents of which are mucous, soda, and sulphur. The purest albumen which we can ordinarily obtain, is the white of eggs. Albumen possesses the power of coagulation, by heat or acid, by which both its appearance and properties are changed, it is no longer soluble either in hot or cold water as before. The coagulation will take place, although air be completely excluded; and if air be present, it will not absorb it. Authors have advanced several opinions respecting the coagulation of albumen; but to us it is plain that the effect is produced by the action of both caloric and oxygen. None of the earths form insoluble compounds with albumen, neither do the alkalies. The case is very different with the metallic oxides; there are few of them but what have some direct action upon albumen: nitrate, subsulphate and muriate of mercury, as well as several others of them, precipitate it—every metal but cobalt precipitates it. Dr. Bostocks experiments show that one drop of a saturated solution of corrosive sublimate, let fall into water, containing one two-thousandth part of its weight of albumen, produces an evident milkiness, and a curdy precipitate falls; he even proposes the employment of this salt, to separate albumen from fluids containing it. The curdy

part of milk consists of albumen, and abounds in the chyle ; it forms an essential part of bone and muscle ; brain may be considered a species of it, and the lens of the eye. Cartilages, nails, horns, hair, &c., are almost entirely composed of it. In fact, it is one of the most important of the human fluids—its constituents are, carbon 53.40 ; oxygen 25.30 ; hydrogen 6.80 ; azote, 14.67.

Cartilage has been examined with considerable precision, by Mr. Hatchett, and found to be in every respect coagulated albumen, and alike capable of being converted into gelatin. This cartilaginous substance is the portion from which the bone is formed ; hence the reason, why they are so soft in young children,—afterwards the phosphate of lime is gradually deposited, to give the bone its requisite firmness. The gelatin give it toughness and strength.

We shall next take notice of the chemical properties of the blood, that fluid being the great source from which all the fluids and solids are formed. Some authors consider the blood as the vital fluid, because it receives oxygen in the lungs, but it likewise receives electricity, which renders it capable, by being thrown by the heart throughout the whole system, to continually nourish and support it. That it may in a great degree, be considered as such, if any one fluid is entitled to that appellation, there is no doubt—yet the properties which enable it to impart vitality to the system, are oxygen and electricity, which it receives from the atmosphere.

It unquestionably is that fluid which gives life and vitality to every proportion of animated nature ; but it is equally plain, that it may likewise disseminate the seeds of disease, whenever it shall become charged with morbid matter, and, likewise be the cause directly or indirectly, of producing death : therefore, upon its purity or impurity depends in a great degree, the preservation of health, or the existence of disease.

We are aware, that by many, it is contended that the blood is always the same: although, this opinion may be entertained by some scientific men, yet it is difficult to induce others to believe that such is the fact—we, ourselves, claim to be of that sceptical number. There have been numerous analyses of the blood. The number of philosophers who have devoted their time to develope its nature, and ascertain its properties are immense. It was not, however, till towards the middle of the eighteenth century, that much progress was made in its chemical analysis.

Ronelly was the first chemist who published a tolerably precise analysis of it. Since that time much additional information has been acquired by the experiments of Bouquet, Fourcroy, Dayeux, Parmentier, Brande, Berzelius, &c. Dayeux and Parmentier examined the blood drawn from patients labouring under different diseases; but the result was not so satisfactory as might have been expected. It has long been known that blood drawn from persons labouring under inflammation, is soon covered with a white crust called *buffy coat;* in this case, the blood does not coagulate as usual. Blood drawn in sea scurvey, exhibits a peculiar smell. It is known that blood when drawn separates into two parts, one of which is fluid, and is called serum; the other, the coagulum, has been called cruor, because it alone retains the red colour which distinguishes the blood. This separation is very similar to the separation of curdled milk into curd and whey. The serum, or fluid part of the blood, Berzelius analyzed, and found it to consist in 1000 parts, as follow: 905.0 water; 80.0 albumen; 6 muriate of potash and soda; 4 lactate of soda with animal matter; 4.1 soda, phosphate of soda with animal matter; 0.9 loss. The cruor, or clot, according to the analysis of Berzelius, consists of colouring matter 64, fibrine and albumen 36, in 100 parts. Vogel has shown that when blood is

placed in the vacuum of an air pump, a considerable quantity of carbonic acid gas separates from it. We observe from the above analysis of both the serum and clot of blood, that a large proportion of albumen exists in both; and that albumen and fibrine are the two principal constituents. That albumen should exist in the blood cannot be matter of surprise, being formed by the transposition of vegetable matter into animal. The fibrine in the blood is prepared from the albumen, and is the first process of nature to form solids from the blood. This fibrine goes to form the muscular substances of the flesh of animated beings, whilst at the same time the various other organs absorb from the blood that peculiar fluid which they require for their support. The constituents of fibrine are 18 atoms of carbon, 5 of oxygen, 14 of hydrogen and 3 of azote, which is one more atom of carbon, hydrogen and azote, and one less of oxygen than albumen. Hence it is evident that inflammation decomposes albumen, or so far impairs its properties as to render it incapable of coagulation.

Much speculation has existed about the colouring matter of blood, some asserting that it owed its colour to a quantity of iron which it contained. It is true that by the incineration of blood, traces of iron may sometimes be detected, but that it existed there previous to the incineration we deny, but might be produced by the process. Albumen as shown, is a large constituent of the blood. Nitric and dilute muriatic acid form with albumen a yellow colour, and when ammonia is added assumes a deep orange colour and lets fall no precipitate; but when *saturated* with ammonia, the liquid assumes a deep orange colour, inclining to red.

Now as muriatic acid constantly exists in the system in considerable quantities, and is likewise continually received into it, in the shape of muriate of soda, as well as a small proportion of nitric acid, may not this give rise to the colour of the bile?

and as it respects ammonia, there is always a large proportion in the system, as it is produced from the decomposition constantly taking place. Then may not this be the cause of the red colour of the blood ?

There is one important point in relation to the blood, which physiologists have too much overlooked, I mean the existing difference between venous and arterial blood: were this difference fully understood, it would illustrate many important points in the nature of disease, now involved in mistery. The character and office of the arteries are directly the reverse of that of the veins. The arteries from the very character of their operation, show that they are exhaling vessels, and the veins on the contrary evince themselves to be absorbing vessels, hence it is evident, that a vast difference exists between them; and the character of the fluid circulating in them must necessarily in a great degree be of a directly opposite character. To explain this difference minutely requires a perfect illustration of the constituents and changes to which animal matter is subjected. The analysis of blood hitherto made, has principally been confined to the venous blood, which is of a dark colour, far more so than the arterial blood. It is of a thicker consistency and of a much lower temperature; why it is so is not difficult for the mind given to reflection to understand. The colour of blood we have before hinted at, but in addition to the idea there suggested, we find the venous blood always charged with carbon in a greater or less degree: then is there some source from which it must have derived it. Carbon is always produced from the decomposition of both animal and vegetable matter, and that the human body is continually and at all times undergoing decomposition we consider it no difficult task to demonstrate. And if so, and the veins being absorbing vessels, as a matter of course whatever product was formed by the constant decomposition, must be absorbed into the venous blood

and thus necessarily become a constituent of it; and particularly if there be deficient action in the capillary vessels of the skin. Carbonic acid gas is an acknowledged constituent of the blood; but in what way does carbonic acid gas become a constituent of the venous blood? Oxygen, one of the gases of the atmosphere, is continually absorbed by the lungs, as well as by other portions of the body; which oxygen gas readily unites with carbon and forms carbonic acid gas. The great office of the lungs, is to bring the blood into direct contact with the atmosphere, in order that this carbonic acid gas should be disengaged from the blood, and a fresh supply of oxygen and electricity introduced into it, in order to form arterial blood. It is this carbonic acid gas, and formed in this way, supposed to generate in the stomach, intestines, &c. which so many individuals are troubled with, under the character of flatulence, &c.

The venous blood, always contains more or less mucous, which renders it of a thick or viscid character. The mucous in the blood being so great a source of difficulty, and frequently the cause of the most serious results; we shall endeavour to illustrate somewhat the character of this fluid. Mucous exists in abundance in almost all kinds of vegetable matter, and consequently must become a constituent of animal matter. Mucous was once considered as partaking of the character of gum, but the experiments of Dr. Bostock have shown that its character differs very materially from that of gum, and that if the solid matter obtained by evaporating saliva to dryness, be redissolved in water and filtered, the solution will contain very little except mucous. Saliva is that fluid secreted by certain glands, called salivary glands, in the mouth during mastication. It fixes with, dissolves, and resolves into its principles the food; and changes it into a pultaceous mass fit to be swallowed. Its constituents are water, mucilage, albumen, muriate of soda, phosphate of lime and phosphate of ammonia.

Hence the difference between mucous and saliva, is that mucous ordinarily contains neither phosphoric acid, lime, nor ammonia. Mucous and uncoagulated albumen, are of a similar character, and constituted of the same ingredients, but vary in the proportion of those ingredients. Mucous has the property of absorbing oxygen and thus becoming incapable of solution in water. Tears are of the same character as mucous. The mucous of the nose was examined by Fourcroy and Vauquilin and found to be the same. Dr. Pearson examined that which is expectorated from the lungs and bronchiæ, with much care and ingenuity, he distinguished seven different kinds of expectorated matter. 1. The jelly-like semi-transparent kind of a bluish hue, excreted in a state of health; 2. The thin mucilage like transparent matter, so copiously expectorated in bronchial catarrh; 3. The thick opake straw coloured or white and very tenaceous matter, coughed up in a great variety of bronchial and pulmonary affections, especially in that of tubercles. 4. Puriform matter, secreted without any division of continuity, or breach of surface of the bronchial membrane, very commonly occurring in pulmonary consumptions. 5. The matter, which consists of opaque viscid masses, together with a transparent fluid, or the second sort above stated, with nodules of the third and fourth kind. 6. Pus from the vomicæ of tubercles. 7. Pus, from vomicæ by simple inflammation of the lungs, and without tubercles. Dr. Pearson's experiments show that the constituents of the first five of these species, are the same, but that the proportions of the ingredients somewhat vary. He supposes them all to consist of albumen in solution in water, coagulable by heat, and the usual chemical agents, and that this albumen is combined with potash, which it neutralizes. The property which mucous has of absorbing oxygen, renders it thick, tough and viscid, hence the viscidity of the mucous from the nose and lungs, as they

are constantly in direct contact with the atmosphere, have also the great consistence which it acquires during colds, where the action of the atmosphere is assisted by the increased action of the parts.

The foregoing remarks show that mucous is a large constituent of the blood, which is increased according to circumstances. When the blood is highly charged with mucous, it is likewise rendered thick and viscid; and when it is not in considerable portions separated and discharged from the blood both by the nostrils and lungs, serious difficulties must soon arise, and always do when those excretory organs cease to act, or inefficiently perform their office, as almost every individual has witnessed cases wherein a cough has been stopped or suspended, and consequently expectoration, by the administration of opiates, or some narcotic, that life has soon ceased to exist.—When this mucous exists in the blood, in undue quantities, it must be discharged from it, either by the lungs or nostrils, these being the principal excretory organs for mucous; and if the lungs be sufficiently strong to resist it, it will be discharged by the nostrils, and is then called catarrh, which, by long continuance, has received the appellation of chronic catarrh. On the contrary, when discharged by the lungs, and the labour of the lungs thus increased, by which they become debilitated, eventually may terminate in a disease of the lungs; and the irritating properties of this mucous often produces an irritation and inflammatory state of the lungs; particularly when the catarrhal affection is transferred from the head to the lungs, which is frequently the case, and is then known as catarrhal consumption.

Other properties may likewise contaminate and render the blood impure. The evidence existing of the bile from the liver being absorbed into the blood is conclusive. It is evinced by the yellow or sallow complexion—dark spots or appearances

on various parts of the body, particularly the forehead—the yellow tinge of the eyes—the yellowness and sallowness of the skin generally, often producing yellow jaundice, bilious fever, and yellow fever. The bile when having acquired a state sufficiently attenuated by decomposition to be absorbed into the blood, possesses a very acrimonious character, which imparts this principle to the general mass of blood; and thus from the venous blood are many irruptions produced upon the skin, and sometimes ulcers of the most malignant character.—Soreness of the mouth, tonsels, &c., which are often known by the name of canker, erysipelas, scarlet fever, bilious fever, petechial fever, and a variety of other complaints, thus derive their origin from the acrimony of the blood, and particularly if there exist a state of the atmosphere favourable to the developement of disease. Other evils arise from the thick and viscid state of the blood thus acquired.

The office of the heart is to propel the blood both to the lungs and through the system. In consequence of the blood acquiring this thick and viscid character, the labour of the heart is increased; which increased labour debilitates that important and essential organ, and hence its powers are proportionally diminished, which give rise to many most serious evils. The increased debility of the heart gives rise to palpitations, the debility still progressing, terminates in a disease of that organ, as enlargements, water in the pericardium, the membrane, or sack, which surrounds the heart, containing a liquid for its lubrication. Pain, dizziness, drowsiness, dimness of vision, fullness of the head, ringing of the ears. Vertigo is often experienced. This is generally called a "rush of blood to the head." The reverse is directly the fact. At every pulsation of the heart, the blood is thrown from the heart to the head, through the arteries. From those large arteries, it ramifies into smaller and smaller ones, until it reaches the capillaries,

or small blood vessels of the skin, from which capillaries, it is received into the extremities of small veins which enter larger ones, until it returns again to the heart. A moment's reflection will render the whole principle familiar to the mind. The blood becoming of this thick and viscid character, renders it incapable of passing through the veins back to the heart as fast as it is thrown from the heart to the head. Its motion, therefore, through the veins is slow and sluggish—it is retarded.—Not only is the blood thus retarded by its thick, viscid consistence whilst flowing through the veins, but it must be born in mind, that the accumulation constantly increases by the power of the heart continually propelling the blood to the head through the arteries. Hence, instead of its being "a rush of blood to the head," it is an accumulation of blood in the head arising from its retarded passage through the veins. The veins of the head thus becoming filled, charged, and in some cases even gorged with blood, gives rise to those difficulties above named, and even to apoplexy itself. Nervousness is another result arising from this viscid state of the blood. As all organs receive their support from the blood, it is evident that blood must be in a situation, and of a character calculated to render them the requisite support. The nerves are very small organs, and the source from which we derive all sensibility—without them we could not be animated or intelligent beings. When the blood is of that thick and viscid character, those small vessels, the nerves, cannot absorb from the blood that support, that nutriment which they require—in common language they are deficiently fed, or starved ; consequently they become weak, debilitated and exhausted, and not unfrequently does it progress so far as to produce the most serious consequences, as derangement of the human intellect, a total loss of reason and intellectual power. The nerves may be compared to a spear of grass, withering and dying for want of moisture ;

just so are the nerves when deprived of their necessary support from blood. The same character of debility is produced in every organ of the body, by a thick and viscid state of the blood, as occurs in extreme hemorrhage, or bleeding from any portion of the body; the debility in both instances is produced by the various organs being deprived of support from the blood—the only difference is, that in the thick state of the blood, the blood vessels, filled and gorged with blood, become distended, from which circumstance much pain may be experienced, which is often supposed to be rheumatic pains. My readers will bear in mind that I have before shown that the veins are filled with valves, which is not the case with the arteries.—These valves serve the purpose of preventing the blood from having a retrograde action in them. The blood can pass on through them, whilst those valves open in order that it may pass; but should any circumstance arise to induce the blood to return back, those valves close, and prevent such an occurrence. Nerves pass in every direction of the body, and as we have just said, they are the only organs from which we derive sensibility. They always accompany blood-vessels, and in many cases form large clusters, running and intertwining themselves among each other. When the blood is thick, it often accumulates in the veins, between the valves, which necessarily enlarges or distends the vein, in that particular part which presses upon the accompanying nerves, and thus produces pain, upon the same principle that you pinch your hand and it gives pain, because the nerves are oppressed. It is always the case when an accumulation of blood takes place in a part that pain is produced—it is in this way that pleurisy arises by the pleura being charged and distended with blood. Upon the same principle do we account for what is termed "shooting pains across the chest, &c. We will here notice another circumstance, that the weakest part of the system will invariably

become highest charged with blood, simply because in the first place by its debility it is rendered incapable of resisting the influx of the blood to that part; and secondly, that when the accumulation takes place in such part, it is less able to expel it from such part. Pain may take place in a part where there is no inordinate accumulation of blood; but pain could not exist there independent of obstruction in the circulation of the nervous fluids, which become obstructed either by themselves becoming rigid, or the cartilage or ligaments assuming a similar character, and producing pressure or obstruction in them. This is generally called rheumatism, which to say the least is no other than an ambiguous term which few understand, and still less comprehend. Numbness of the limbs, palsy, paralysis, the entire loss of the use of a limb is produced by this same principle of action, the circulation of the blood being so deficient in many cases, as to cause a limb or part more or less to dwindle and perish.

In the arterial blood we find difficulties of another character arising. As before shown, the blood contains phosphate of lime; when it contains a surplus or more than is absorbed or taken up from the blood, for the supply required for the general fluids and organs of the system, ossifications are sometimes formed near the heart, or in the coronary artery, and likewise in other parts of the body: these formations are phosphate and carbonate of lime. The formation on the internal coats of an artery, lessens its calabre, and as nerves are intimately connected with arteries, and blood is thrown though arteries in volumes from the heart at every pulsation, by the force of the volume of blood the artery is slightly enlarged, but by passing through that portion of the artery where this ossification exists its distention would be so great as to produce pain, which is quick, and not inaptly termed similiar to that of a sharp knife. It is this enlargement which we call pulsation, and is felt in

every portion of the system at the same time, where an artery is found.

We will dismiss the subject of the blood by pointing out in some measure, the different diseases that may be produced both by the arterial and venous blood. We have already noticed that a difference existed in temperature between them; that the arterial was higher than the venous. The high temperature of the arterial in certain climates, and at certain seasons of the year, may produce a disease of the lungs. The ordinary temperature of blood, is about 102 degrees above zero. The difference between the blood and the atmosphere, is often very great at certain seasons of the year. Sometimes the temperature of the atmosphere falls to 10 and 20 degrees below zero, making a difference of 112 and 120 degrees, between the atmosphere and the blood. The blood in the lungs is constantly exposed to the atmosphere, and the consequence arising from this great difference is frequently of serious import; a sudden exposure, such as passing from a warm room, immediately into such a state of the atmosphere produces so directly an irritative action upon the lungs as to produce cough, and frequently to terminate in pulmonary affections. This difference of temperature, is the cause of the existence of diseases of the lungs, in a great variety of instances, and may almost *invariably* be considered the cause where the lungs themselves are the only organs diseased. The arterial blood predominates in the chest, which contains the heart and lungs; this being of the highest temperature, is the reason why diseases of the lungs, prevail more in cold climates than in warm. The venous blood, the blood which circulates in the veins, predominates in the abdomen, which contains the liver, kidneys, spleen and digestive organs, being of a much lower temperature than the arterial blood shews likewise the reason, why it is that diseases of the liver, abound most in warm climates. The low temperature of the

venous blood, being acted upon by the high temperature of the atmosphere, upon the same principle produces irritation, and consequently a disease of the liver follows, which in its train, produces a great variety of other affections, which medical men have construed into a variety of different diseases, and have almost uniformly undertaken the treatment of them as such; whilst they at the same time have suffered the original and primary organ diseased to pursue its course of destruction, until the liver itself, has become a mass of irrecoverable obstruction, as we shall ere long more fully illustrate. In this illustration we find another important fact developed to our understanding.

It is generally known that it is the general practice, where an individual is labouring under a disease of the lungs, to direct, that the patient be sent to a warmer climate, particularly during our winter seasons. We have the evidence, that there are some who go there and return apparently well, while others who go there for the benefit of their health, die. There must be a reason for this! What that reason is, none have attempted to define. A little reflection, renders the subject perfectly intelligible. There is a possibility of an individual, having a disease of the liver, and that disease to extend its influence to the lungs, and hence produce pulmonary consumption —it is the most usual form of the occurrence of the disease of our climate; out of every twenty cases of diseases of the lungs, in our country, hardly two can be found that do not date their origin in a disease of the liver; therefore, if there exists a disease of the liver which has extended its influence to the lungs, the liver and lungs both being diseased, if such patient be sent to a warm climate, the disease of the liver will be increased, which would likewise, and must necessarily increase the disease upon the lungs, and the patient would in all probability be lost. But if, on the contrary, there existed a disease of the lungs, in which the liver was not implicated, such individual visiting a warm cli-

mate might induce more or less affection of the liver, and thus the disease might be transferred from the lungs to the liver, under which circumstances it would not be very difficult to cure the diseased liver, and in all probabilty the disease of the lungs might effectually be cured. We thus distinguish that diseases of the lungs, and diseases of the liver, are two distinct and opposite diseases, and although produced from the atmosphere, yet the state of the atmosphere in one case is directly the reverse in that of the other—and further, as the properties of the arterial blood are different from the venous blood, it is evident that there are diseases confined exclusively to the venous blood, whilst others, again, are confined to the arterial blood ; and, consequently, each must absolutely require different modes of treatment. What will the advocates of the doctrines of "one disease"—"disease is a unit"—say to this illustration? They will find greater difficulties to contend with than this, before we close our subject. Nor will those who advocate the doctrine of so great a multiplicity of diseases, find any room whatever to sustain the opinion, that their prognostications are founded upon any other principles than their prolific imaginations. Neither will they find us advocating the doctrine, that all diseases primarily originate in the blood and that alone. And much less entertaining the theories of the present day, that "all diseases originate in the solids." We leave that to those—who guess—who try experiments—because they don't know—who worship their *Idol*—their "vital principle."

The next subject we shall enter upon is the bile, which is formed from the venous blood in the liver. Having heretofore referred to this fluid in some measure, it only becomes necessary now to refer to it so far only as it has not before been treated. The liver is the largest gland of the body, situated in the abdomen, and is attached firmly to the diaphragm, or midrif, a mus-

cular substance which divides the chest from the abdomen. The liver is of a deep red colour, divided into two principal lobes, and again divided into smaller ones, the right lobe extending far down on the right side, thence extending across the middle of the body towards the left side, filling the hollow formed by the diaphragm. It never entirely reaches the left side, the large end of the stomach being placed between the left lobe of the liver and left side. The upper surface of the liver is convex ; the under part slightly concave. Its front margin is thin,whilst its hinder edge is very thick and rounded. Much the largest portion of the liver lies upon the right side, and is much thicker and massive there than on the left, and as it approaches the left side, it becomes thinner and smaller. The liver receives nearly all the venous blood from the lower extremities of the body and abdomen by a large vein which enters it, called the *vena porta*. The instant the vena porta enters the liver, it ramifies through the whole organ, like an artery, thus diffusing the venous blood throughout the whole substance of the liver. From the venous blood is that important and essential fluid the bile produced. Under the liver is situated an oblong membraneous receptacle, called the *gall bladder*, the use of which is to receive the bile from a vessel called the hepatic duct, which is the trunk of what is called the biliary pores, which, together with the cystic duct, which is the trunk of the biliary ducts, carries the bile to the gall bladder. The gall bladder is therefore the receptacle and reservoir of the bile. From the gall-bladder, the bile is conveyed through a small tube about the size of a crow-quill, into the duodenum, or small intestines, situated immediately below the pit of the stomach. The composition of human bile, as illustrated by Thenard, is from 1100 parts of human bile, 1000.0 water, from 2 to 10 yellow insoluble matter, yellow matter in solution a trace, 42.0 albumen, 41.0 resin, 5.6 soda, 4.5 phosphate of soda ; sulphate of soda, muriate of

soda, phosphate of lime, oxide of iron. The analysis made by Berzelius is somewhat different. In 1000.0 parts, he found its constituents to be water 908.4, picromel 80.0, albumen 3.0, soda 4.1, phosphate of lime 0.1, common salt 3.4, phosphate of soda with some lime, 1.0. Human bile differs somewhat from animal, which is easily accounted for from the difference in food. Its taste is not very bitter. Medical authors state that the *exact duty* the bile has to perform in the office of digestion, is not understood. We agree with them that *they* do not understand it, nor will they so long as they form their conclusions upon supposition and imagination. Let them ascertain but the chemical constituents of the bile, and of the chemical constituents of the chyme in the duodenum, and then say whether or not the bile performs any other office than that heretofore named, or whether or not it is the "natural purgative." As before shown, the liver is capable of becoming torpid and inactive, by which means accumulations of blood, bile, &c., take place in the liver, which would cause the blood vessels of the liver to become distended, and the liver to enlarge or swell; under such circumstances, the liver being attached to the diaphragm, its enlargement would press it up, and hence lessen the cavity of the chest which contains the heart and lungs. The lungs would then be crowded or oppressed, and hence would arise shortness of breath, difficulty of breathing, giving rise to phthisic, asthma, and a variety of similar affections. Sometimes by long continuance, the liver becomes permanently enlarged, and the consequence is, a continued asthmatic affection. I am aware that many physicians have considered asthma produced by spasmodic action of the lungs; but I am at a loss to determine how spasm can take place where there is no muscle; and I have yet to learn that the lungs are a muscular substance. I defy gentlemen to exhibit a case of asthma where the liver is not at all implicated. As before shown, the bile in consequence

of decomposition, becomes thin and acrid; and when in this state, conveyed through the bile-duct into the duodenum, it is capable by its acrid properties of producing a disease of the duodenum by irritating and inflaming the mucous or lining membrane of the small intestines; hence is frequently experienced a sinking, fainting, indescribable weakness just below the pit of the stomach. It often extends its influence to the pylorus; so much so as to produce ulceration in that part, by which, at times small blood vessels become ruptured, and blood is discharged by the mouth, and may be mistaken for bleeding of the lungs. But the blood discharged under these circumstances, at once distinguishes its true character--such blood is dark and has rather the appearance of blood drawn from a vein, whilst that which is thrown from the lungs is of a light or florid red. In this way, may the organs of digestion and assimilation become so injured or impaired, as to be rendered incapable of duly performing their office, so that the food eaten cannot impart that nourishment and support to the system which it requires, and emaciation will then progress, although the stomach be inordinately supplied with food.

Another difficulty which may arise, in consequence of this decomposed state of the bile, is ascidity or sourness of the stomach. It will be perceived by the analysis of the bile, that it contains, even a free alkali when in a healthy condition; but by the decomposition, this alkaline principle is destroyed, hence the bile is rendered incapable of neutralizing the acidity, generated from food in the stomach, or conveyed there from other sources. Another evil complained of, is flatulence or wind upon the stomach. By what peculiar change or operation are gases engendered in the stomach and intestines? We have before shown that the blood contained carbon, and that it was the carbon uniting with the oxygen, forming carbonic acid gas, which was the cause of this difficulty. Sickness and

nausea of the stomach, is another difficulty experienced under these circumstances. When the bile is thrown into the small intestines in larger quantities than is required, it is frequently found to regurgitate through the pylorus, into the stomach which there coming in direct contact with the gastric juice, creates sickness and nausea, which, from their very different properties and constituents, no other result could be predicated. Hence the very correct observation so frequently made, that the "stomach cannot tolerate bile," it rejects it almost as soon as introduced into it. This state of disease is often met with in what are called bilious habits of body, in bilious fever, &c., yet the general mode pursued in the treatment of such cases, is of a character which I can by no means sanction. A physician is called to a patient, to whom after examining his case, he directs an emetic. In a short time he calls again : the emetic has operated; "see," says the physician, "what a quantity of bile he has thrown up ; it was well that I gave him the emetic." Does not the medical gentleman know that the bile of which he speaks was not originally in the stomach, but was induced there by the direct action of the emetic upon the small intestines, and that it was urged from them by the exciting action of the emetic ? The reader may be somewhat surprised that I oppose the use of emetics, when they have long been (even since the establishment of medicine as a science) in almost constant use, and at this day without scarcely an exception, universally advocated and adopted by every description of medical men. If an individual in the enjoyment of perfect health should take an emetic, as soon as the contents of the stomach should be thrown off, bile would inevitably follow, not because it originally existed there, but because it was induced there by the emetic. The bile forced into the stomach by the use of emetics, often keeps up vomiting until the patient dies of exhaustion, or until the over-exerted liver loses its pow-

ers of secretion, and stops. In the latter case, the patient may recover, but his convalescence will be long and protracted, attended with an inactive liver, without tone to the stomach—his recovery being most generally ascribed to certain medicine, and extolled for its virtues, when in fact it was the ostensible agent in producing his desperate situation. As useful as they may appear to be, defended by argument ever so strong, I am satisfied, and much experience will afford ample testimony, of serious evils resulting from their use; especially where employed to the almost unlimited extent, so frequently practiced by its particular votaries. We cannot consider, that nature ever designed the contents of the stomach should be discharged by the mouth; yet it is said, does not nature indicate this when she is about to disgorge the stomach of its contents? The contents of the stomach being offensive to her, does she not repel it? Is this action of stomach not sufficient to determine us in our prognosis? If the peristaltic motion governed the stomach, as well as the bowels, it would be; but the case is vastly different, one is the regular action conducive to health; the other, the irregular action indicative of disease. One is the healty action of the intestines; the other, the irritability of the stomach, dependent upon disease. But we are again asked shall we not give an emetic to disengage the offending matter from the stomach? What! increase the irritability? Would it not be better to allay it? But it is again said; the emetic acts by relaxation! Relax the stomach--deprive it of its energy—subdue its ability, to compel it to evacuate its contents? This is incomprehensible; but were this even probable, and were I to admit it to be so, by such relaxation, might not permanent injury accrue to the stomach? It is frequently asked, does not nature produce nausea in young children when the stomach becomes over charged? What organ will not disgorge itself, when overloaded; the blood vessels themselves are

ruptured when over loaded. Does such an illustration argue the indispensability of emetics? The safest stept, is to avoid the danger altogether.

I think every judicious practitioner will agree with me in this particular. The proper and only course of the alimentary canal is downward. It is the course clearly pointed out in the anatomy of all animated beings. To institute emetics, is to reverse nature's known and obvious laws. Who that will reflect for one moment, but must perceive the injurious action of emetics, particularly in bilious affections, where they are so frequently prescribed. I do not mean to be understood, that emetics are invariably useless; there may be cases where they may prove beneficial; it is their too frequent use that I object to. In cases of insufficient secretion of bile, or a torpid state of the liver, emetics, so far as to restore this secretion, would be useful; but if persisted in further, they would produce mischief. Again, an emetic would be useful, where it were necessary to evacuate immediately the contents of the stomach, as in cases of swallowing some powerful escharotic or narcotic,—yet in general, their use is seldom required. The use of emetics has led many physicians into error. They generally have a sudorific effect, in consequence of the excitement produced by their operation; and the benefits arising therefrom, are attributed to the evacuation of the stomach. Where emetics are employed, we are decidedly opposed to tartarized antimony, as this article, it is well known, is capable in the form of ointment, of producing pustules upon the skin, when externally applied. It cannot therefore, be difficult for us to imagine what must be their action upon the tender coats of the stomach. If used at all, vegetable emetics, are far the least objectionable.

The evils which are produced by the absorption of bile into the blood, we have before stated; yet there are other points which might interest our attention. The bile appears to be the

only fluid separated from venous blood which is applied to any useful purpose in the animal economy ; it appears in a measure the connecting link between animal and vegetable substances, by the office which it performs, as it is impossible for the nutritive part of our food to be separated from the general mass of food thrown into the intestines, without the aid of this important fluid. All the other secretions from the venous blood, are thrown from the system by the various excretory organs, as that which is useless and inappropriate for the growth and support of the body.

We shall now enter upon a most important task, the illustration of the *brain* and *nerves*, in which we may advance opinions from the views which we entertain, of a very different character, from that generally advocated by medical men. It has been usual to consider all the nerves as emanating and deriving their origin and support from the brain. We shall, however, present a different view, and consider the entire nervous system as originating from two distinct sources, from which they derive entire different properties ; and their uses in the animal economy of an entire distinct application. We shall contend that there are two distinct nervous systems of an entirely different character, one having its origin in the brain, and the other in the spleen, which by the illustrations which we think we shall be able to make, may in a measure at least induce further investigation. We are aware that anatomists have not heretofore assigned any particular uses to the spleen. We, on the contrary, consider it one of the most important organs of the human body. It is situated on the left side between the eleventh and twelfth false ribs, in contact with the diaphragm beneath and behind the stomach, and between the stomach and spinal column.

The spleen or milt is a spongy, dark, red substance, of an oblong, round figure, larger when the stomach is empty than

when full, convex towards the ribs, and concave internally, with an excavation, in which vessels are inserted. It forms connections with various organs by ligaments, vessels, nerves, &c., as the stomach, caul, left kidney, diaphragm, peritoneum, pancreas, large intestines, &c. It is covered with a strong membrane, which adheres to it very firmly. The splenic artery pursues a serpentine rout over the pancreas, and behind the stomach in which it gives off branches to neighbouring parts, then enters the concave surface of the spleen, where it ramifies into numerous smaller arteries, from which it is taken up by small veins, which uniting with each other, form the splenic vein, which uniting with the coronary vein of the stomach, and some others, form the left branch of the *vena porta*. It is admitted that the spleen receives a larger supply of blood than is necessary for its mere nutrition ; but in what manner this blood is appropriated, has ever been matter of conjecture. Some have supposed, that by its intimate connection with the stomach—it performed some important office in digestion, but the idea has hitherto been considered but speculative. That the spleen receives a greater supply of arterial blood than any other organ of the human body of similar size (the brain alone excepted) is a fact which cannot be refuted. And further, that such arterial blood, after having become venous, as in the splenic veins, is incapable of coagulation, a circumstance which does not manifest this result from the venous blood of any other proportions of the system whatever, shewing most conclusively that in the spleen a greater proportion of the essential and vital constituents of the blood must be in a greater degree exhausted, than in any other organ.

The brain is a large, round organ, situated within the cranium, surrounded by a thick, and somewhat opaque, and insensiber membrane, formed by two layers, which defends the brain, and adheres strongly to the internal surface of the cra-

nium. This membrane is supplied with blood from the internal maxillary artery, which is a branch of the external carotid artery : when it reaches this membrane called the *dura mater*, it divides into three or four ramifications and spreads itself throughout the dura mater, to the anterior, middle and posterior lobes of the brain. The brain is thus constantly largely supplied with arterial blood.

From these two important organs, the brain and the spleen, we shall base our doctrines of the nervous system, leaving the opinion entertained by some distinguished anatomists, " that a certain portion of the nerves have their origin in the spinal column " for the reflection of the reader, after he shall have investigated the principles herein presented. The nerves are the great source from which we derive every sensation either of pleasure or pain—they ramify minutely into every portion and part of the human body, thus imparting feeling and sensation. By means of nerves, we see ; by means of nerves, we hear ; by means of nerves, we smell ; by means of nerves, we taste ; by means of nerves, every power and sensation which we enjoy is imparted to us; were it not for those nerves of sensation, we could not be possessed of intelligence. How can a blind man judge of colours ? how can a deaf man judge of sound ?—how can an individual distinguish between sweet and sour, except by taste ? how can we distinguish articles by their smell, except by the olfactory nerves. What would be our situation deprived of the nervous system ? could we reason ? could we calculate ? could we reflect ? could we think ? would we be capable of judgment ? would we be capable of receiving one sensible impression ? could motive for the performance of any act be engendered ? or could we possess the will or the power to perform any act whatever independent of the nervous system ? According to the strength of the nervous system, are our powers of mind, our energies,

our talents. It is by their powers, that we derive and retain information and knowledge. Hence is perceived the cause why it is, that the mind of one individual is more sagacious and penetrating than another ; and why it is, that one becomes insane whilst another remains sane. Why it is, that the mind of one man is directed in one channel, and another directly the contrary—that one is credulous and another incredulous—that one receives impressions and convictions, which another does not. It is the different structures of the nervous system. We have but spoken of the nerves of sensation, which have their origin in the brain, from which they receive their support, and from which they derive their power to act. All the nerves of sensation communicate with the brain, and instantaneously communicate information to the brain on every occasion.—The eye perceives danger—how ? Through the medium of light acting upon the optic nerve, which sensation being instantly conveyed to the brain by the optic nerve, other nervous powers are instantly placed in requisition by the brain, the grand focus and superintending agent of the nervous power to escape the danger. Thus is intelligence imparted to the brain and judgment determined. Judgment, reason, reflection, &c.. are the result of the union of the different nervous powers of sensation. We can have no cognizance of mind independent of matter, and that the result of a peculiar organization. The nerves of sensation are straight cords, of a white colour, extending to all parts of the animal frame, and in some parts very numerous, and so small, and their course so intricate, that it has been impossible for the anatomist to detect them ; yet the evidence of their existence cannot be matter of doubt, it is confirmed by sensation itself.

We now enter upon the illustration of another set of nerves, which for distinction sake, we shall denominate *Organic Nerves*, which we allege are of a very different character and

their purpose and office, of an entirely contrary order. They likewise run throughout every portion and part of the system, often along side of the nerves of sensation, and in some instances enclosed within the same sheath ; but never uniting or forming a part or portion of the nerves of sensation ; neither do they draw their support, from the same source which the nerves of sensation do ; and although their small twigs may enter the dura-mater of the brain, and even into the substance of the brain itself, yet are they not found uniting with the nerves proceeding from the brain, or receiving support from the brain, but on the contrary, imparting important properties to that organ. We find these organic nerves, running along arteries intertwining themselves in their sheaths and even in many cases forming almost the internal coats of arteries. Where they enter arteries or form the internal coats of arteries, they are of a more pulpy or softer mass, than when pursuing their devious routes through the system. The organic nerves are distinguished from the others by their colour and consistence, being neither so white or dense, but of a dingy and flocculent appearance. They again very materially differ from the nerves of sensation, by their forming in various parts, knots or enlargements ; sometimes there are several of these knots or enlargements together, which are called by anatomists, ganglions and plexuses, and some physicians have considered them, as the formation of small brains in the nerves, out of which enlargements, a number of those nerves arise and follow diversified routes.

To trace the history of this system of nerves, from its first origin in embryo, will in a great degree, satisfy the mind of its separate existence, apart from the nerves of sensation, and plainly show that the brain and nerves originate therefrom, are clearly of secondary formation ; and that the existence of the brain itself, with the nerves of sensation, depended on the organic nerves. Why this existing difference, in the nervous

system should have so long escaped the attention of acute anatomists, is not easy to determine; but it doubtless must have more or less excited their attention, from the very different character and appearance existing between these two systems of nerves; but the determination heretofore, to trace all the nerves to the brain, as the common origin, has no doubt, caused this important consideration to be overlooked.

In the first formation of this system of nerves in the fœtus, whilst it is no more than a sack, we distinguish its nervous system to be that of a mere fibre, and while the fœtus gradually becomes compounded of different organs, we perceive that this system of nerves, (the organic nerves) become more complex and complicated, with the addition of ganglia and plexuses, from which emanate the nervous fibre, which, ramifying through the different organs, arteries, and some veins, as the pulmonary and vena porta, each of these fibrils superintending the organ under its immediate controul, and all acting in perfect harmony with each other, whilst the original fibre first discovered, has continued to enlarge and extend itself from the cranium to the *os sacrum*, the lower extremities of the body which is now generally called the *great intercostal* or *sympathetic* nerve. It is at a much later period of gestation, when the brain, its nerves and the spinal column are formed. The knots or nodules, called ganglia, are the reservoirs for the nervous fluid deposited there for the support of this system of nerves, which they have directly drawn from the arterial blood. Hence is perceived that the brain and nerves are an after formation, a secondary thought of nature.

As the organic nerves are the primitive formations, and can neither be traced to the brain nor spinal marrow (although most authors contend that they can, but have no other evidence of it than conjecture)they most evidently cannot be nerves of sensation. That the organic nerves perform a very important

part in the animal economy, it would be folly to deny. Now the fact cannot be denied that the nerves, proceeding from the brain, are the organs of sensation and motion. If they were not the organs of sensation, how could they convey information to the brain? If they were not the organs of motion, why do we move or act by the will emanating from the brain? but where a nerve is cut or severed, thereby destroying or impairing its connexion with the brain. The brain may direct, but such nerve cannot perform. The power of moving a part is lost the instant that the nerves entering it are cut. But there are other motions of the body, such as do not depend upon the will: these are called *involuntary motions;* they are the motions over which the will cannot exercise controul, and consequently cannot be connected with the nerves of sensation and motion. Such involuntary motion we find governing the heart, the lungs, the diaphragm, the bowels, the kidneys, the stomach and the pancreas; and we might ask with the utmost propriety, what portion or part of the human system is there in which this involuntary motion is not evinced, under some form or other—a motion and action which is not at all governed by the will. We have the evidence of the existing superintendence of the organic nerves over the various organs, and in a measure the source from which they derive their support, and can they not be plainly traced to every organ? What office is there then left for them to perform, than this *involuntary motion?* and which action is indispensable for the growth, strength, and support of all animated beings.

As the nerves of sensation, or cerebral nerves (so called) have one general reservoir for the nervous fluid, and from which they derive their energy of action, it is but reasonable to conclude that the organic nerves required a similar structure. That organ we think we shall be able conclusively to show is the *spleen,* to which we have before referred. The

spleen is invariably found in all the larger and more perfect class of animals ; all those animals possessing a brain have likewise the spleen, and those found without the brain are likewise devoid of the spleen. The inference is therefore conclusive that the spleen must perform some important office in the animal economy ; and further, that there is necessarily some important connection between them, the brain and spleen. They resemble each other in various particulars, they are both very largely supplied with blood, the structure of both are peculiar and soft, their membranes are of like texture. In a variety of circumstances do they agree with each other. The spleen lies in close contact with the great sympathetic nerve. The spleen is connected with this system of nerves in a variety of instances, they are found arising out of the spleen, and pursuing their devious routes to various organs, others are found running directly from the spleen to ganglions and plexusus. In the sheath of the splenic artery entering the spleen, these nerves are extremely numerous. The whole spleen is chiefly composed of white fibre, similar to the brain, and of nerves, veins, and arteries.

We here perceive the direct connection of the spleen, with the organic system of nerves. We perceive the large supply of arterial blood, which it constantly is receiving, fresh from the heart; the important change and loss which this blood meets with in the spleen, is it from thence to be concluded that this important organ, is of no use in the animal economy—if so, upon what principle, shall we account for these results? It has be said that the spleen has been removed without injury. Some instances have occurred, where it has been removed from animals, and they have continued for a while, to survive, but not with unimpaired health. In man, even a wound of the spleen, has proved as certain and as quickly fatal as if inflicted upon the brain. That the spleen is to the or-

ganic nerves, what the brain is to the nerves of sensation, cannot be an opinion devoid of consideration. The existing evidences, that it is such, are of the same character, that enables us to determine the brain, to be the grand reservoir of sensorial power.

The spleen then being the source from which the organic nerves, together with the arteries, as before shown, derive their support, their powers and energies ; and those organic nerves extending themselves, and ramifying throughout the various organs, govern, perform, produce and keep up this involuntary motion, by a power which they derived from the arterial blood, and imparted to them by both the spleen and arteries. Then follows this most important principle, that the organic nerves thus maintained by the spleen and arteries, are the grand source and cause of both secretion and excretion ; that they are the great and ostensible sources for both the growth and decay of the human body. We here perceive the great wisdom in the designs of Providence by our organization, that while one set of nerves are ordained to govern, guide, and regulate the growth, action, motion, strength, sustenance, &c., of the human body— another set is subsequently instituted as centinels to watch, to notify, to give the alarm when danger approaches, or any organ or portion of the system is subjected to a course not in accordance with the laws of health by their sensitive principle. Thus, then, does this system of nerves govern the peristaltic motion of the bowels—the motions of the heart, lungs, diaphragm, arteries, &c. and likewise, by the action of these nerves, is the bile, blood, gastric juice, pancreatic juice, urine, and in short, all the fluids and solids of the human body produced and formed, and their various actions and involuntary motions constantly maintained.

In evidence of this fact, we will here quote from a work now in our possession, the case of an injury to the spleen, and

if practical illustrations will furnish the strongest testimony, in favour of the position, which we have taken, we cannot but think they must be conclusive. It says the case " was that of a man in the prime and vigor of life, who was knocked down by a piece of timber, striking upon his left side and back. The shock deprived him for a period of breath, and was accompanied by sharp pain. In a short time, however, he so far recovered, as to rise and walk, and the next day was able to resume his business, and although he complained of neither sickness nor pain, he looked wan and dejected, his movements were less firm and determinate than usual, and he had neither appetite nor thirst. Little variation took place in his condition, except increase of debility and deeper dejection expressed in his countenance, for several days. On the 10th day he was siezed with convulsions. In the intervals, he complained of general lassitude and prickling sensations in the limbs, his respiration was anxious and hurried ; his pulse was very feeble and slow, and occasionally irregularly intermittent; the tongue was clean, smooth and tremulous; temperature reduced so much as to impart a feeling of coldness: he had taken no food, nor voided excrement. When desired to impart his feelings, he distinctly stated, that he felt as if his whole insides were dead, and that he was confident they had been so, ever since he received the blow, as he had never felt them move or act as he was wont to do, — and that they felt heavy." In opposition to expressions of hope of recovery by his friends, he rejoined " No—no ; I am not mistaken ; my insides are dead, and you will soon find that the outsides will not long survive them." He was insensible to the impression of every medicinal agent. The convulsions continued to return, time after time, until at length they subsided in the tranquility of coma and death.

The spleen alone exhibited marks of injury. It appeared as if it had been crushed, and all its interior structure destroyed; yet there was no rupture of its coats The abdominal viscera generally, had the decayed appearance they usually present a considerable time after death. The cadaverous smell was perhaps unusually great. The lungs were considerably engorged with blood, giving them the aspect of hepatization.

There was nothing remarkable in any other structure."

Many cases of a similar character might be introduced were it necessary: they are familiar with many practical physicians.

That the spleen is so greatly concerned in a vast number of affections of the body, is so conclusively evident, that its functions can scarcely be doubted; in many of the derangements of the liver, stomach and bowels, intermittent and remittent fever &c., the spleen exhibits the strongest marks of derangement.

As to the power derived from the arterial blood for the supply of this system of nerves, we have before referred to, and it is only necessary here to remark, that it would appear by the specific and direct action of the organic nerves, that they become quickly or instantaneously charged with electricity and as quickly impart it to the various organs, probably as every volume of arterial blood is thrown from the heart, evincing that peculiar balance of power, existing between positive and negative electricity, (so called,) and is observable by placing small figures between a body charged with electric fluid, and a body less charged with it, called by some, the *electrical dance.*

The composition of the nervous fluid, which is not of so volatile a character as to be disengaged, it is of importance to understand; as it evinces the constituents required to keep up a healthy action of those organs in the system. The chemists who have examined the nature of the brain, are Thouret, Fourcroy and Vauquilin. Vauquilin made quite an elaborate

analysis of the brain, in which he gives us the following as the constituents in 100 parts, water 80; albumen 7; white fatty matter 4.53; red fatty matter 0.7; osmazome 1.12, which is a principle abundantly found in all animal matter, and it is doubtful whether it be any thing other than fibrine, for it is obtained by digesting that substance in water; phosphorus 1.5 and acids, salts, and sulphur 5.45. Couerbe has discovered in the brain a large quantity of cholesterine, which is a substance somewhat allied to spermaceti, and is supposed to be produced by deranged vascular action. M. Couerbe also states that the brain of persons of sound intellect usually contains from 2 to 2½ per cent. of phosphorus: in the brain of idiots, the phosphorus about 1 to 1½ per cent., and in maniacs it amounts to 3, 4, and 4½ per cent.

We shall not be able, in the present edition of our work, to give that extensive illustration, of the chemical constituents of the fluids and solids of the human body, as many perhaps might desire, we shall therefore, touch but slightly upon some more of them, and progress to illustrate the important changes to which animal matter is subjected.

The gastric juice, is that fluid which is secreted by the mucous or lining membrane of the stomach, and thrown into the stomach, for the purpose of dividing or dissolving the food taken into the stomach, into small particles. The power of this fluid, in many cases, is very great, as in the Ostrich, where cases have occured of its even having the power of dissolving copper, and even so great, has its solvent powers been known in man, as to dissolve the coats of the stomach itself. The celebrated physiologist, John Hunter, ascribed the corrosions of this organ, to this cause, as sometimes witnessed in persons who have died suddenly, while fasting and in good health. This fact has been more fully proved by the distinguished Dr. Carswell, and recorded in the Edinburgh Medical and Surgi-

cal Journal, October, 1830. The nature of the gastric juice, for a long time baffled the skill of medical philosophers, from the difficulty of procuring it in sufficient quantities and of sufficient purity for an accurate analysis. The gastric juice is not the same in all animals, for many animals cannot digest the food on which others live. The hemlock, for instance, is a poison to man, yet the goat often feeds upon it. Sheep live wholly on vegetables, and it would therefore be difficult for them to digest animal food ; yet by perseverance they may be rendered capable of it—so with man, habituate him to the use of any article, although it might be poison to others, yet from the constant use of it, he would become so inured to its action that little if any injury would accrue. This is the case with the free use of opium, tobacco, &c.

From all these circumstances we need not be surprised at the contradictory accounts given us respecting the properties of the gastric juice in man ; neither is it worth while to transcribe them. Sometimes it has been alleged to be acid, at other times, not. Spallanzani supposed that its acidity was caused by the food ; and when he fed on vegetables and fruits enclosed in tubes, they were sometimes altered and a little diminished in weight, just as if they had been put into weak vinegar ; but when he used only animal food, it came out untouched. According to him the gastric juice is naturally neither acid nor alkaline. The result, however, of the experiments of Spallanzani shows that the gastric juice attacks the surface of bodies, unites to the particles of them, which it carries off and cannot be separated from them by filtration. The food is not merely reduced to very minute parts, but its taste and smell are quite changed, its sensitive properties are destroyed, and it acquires new and different ones. That the gastric juice does not act as a ferment ; so far from it, that it is a powerful antiseptic ; and even restores flesh already putrified.

There is not the smallest appearance of such a process ; indeed when the juice is renewed frequently, as in the stomach, substances dissolve in it with a rapidity which excludes all idea of fermentation ; only a few air bubbles make their escape, which adhere to the alimentary matter, and buoy it up to the top, and which are probably extricated by the heat of the solution. For further remarks illustrative of the knowledge possessed upon this important fluid, but a few years since, we will give the following extract from an author some time since published. " With respect to the substances contained in the stomach, only two facts have been perfectly ascertained : the first is, that the juice contained in the stomach of oxen, calves, sheep, invariably contains uncombined phosphoric acid, as Macquart and Vauquelin have demonstrated : the second, that the juice contained in the stomach, and even the inner coat of the stomach itself has the property of coagulating milk and the serum of blood. Dr. Young, found that seven grains of the inner coat of a calf's stomach, infused in water, gave a liquid which coagulated more than 100 ounces of milk, that is to say, more than 6857 times its own weight ; and yet, in all probability, its weight was not much diminshed."

" What the substance is which possesses this coagulating property has not yet been ascertained ; but it is evidently not very soluble in water : for the inside of a calf's stomach, after being steeped in water for six hours, and then well washed with water, still furnishes a liquor on infusion which coagulates milk ; and Dr. Young found that a piece of the inner coat of the stomach, after being previously washed with water, and then with a diluted solution of carbonate of potash, still afforded a liquid which coagulated milk and serum."

" It is evident, from these facts, that this coagulating substance whatever it is, acts very powerfully ; and that it is scarcely possible to separate it completely from the stomach,

But we know at present too little of the nature of coagulation to be able to draw any inference from these facts. An almost imperceptible quantity of some substances seems to be sufficient to coagulate milk: For Mr. Vaillant mentions, in his travels in Africa, that a porcelain dish which he procured, and which had lain for some years at the bottom of the sea, possessed, in consequence, the property of coagulating milk when put into it; yet it communicated no taste to the milk, and did dot differ in appearance from other cups."

"It is probable that the saliva is of service in the conversion of food into chyme as well as the gastric juice. It evidently serves to dilute the food; and probably it may be serviceable also by communicating oxgen."

Such was the existing state of knowledge in respect to the gastric juice but a few years ago, when an important but accidental circumstances brought it before the world, in a way by which its properties and character could not fail to become understood.

We will now introduce testimony upon the nature and properties of the gastric juice, of a nature which cannot be mistaken. William Beaumont, M. D. a Surgeon in the United States Army, whilst stationed at Michillimackinac, Michigan Territory, in 1822, had a case of surgery under his care, which affords the most complete opportunity for the investigation of this subject in every particular. The subject was a Canadian, about eighteen years of age, of good constitution, robust and healthy, but was accidentally wounded by the discharge of a musket which consisted of powder and duck shot, in the left side, which entered posteriorily, and in an oblique direction, foward and inward, literally blowing off integuments and muscles of the size of a man's hand, fracturing and carrying away the anterior half of the sixth rib, fracturing the fifth, lacerating the lower portion of the left lobe of the lungs, the diaphragm, and

perforating the stomach, which was larcerated through all its coats, and pouring out the food through an orifice, large enough to admit the forefinger. Under the distinguished surgical skill of Dr. Beaumont, this individual recovered and a few years ago lived in the enjoyment of good health. The wound of the stomach did not close and adhere by cicatrization as ordinarily, but formed an aperture in the stomach and side, over which a small fold or doubling of the coats, of the internal portion of the stomach formed a valve, which covered the orifice. Here an opportunity was offered for the most ample investigation of the properties of the gastric juice; and for ascertaining its action on the food, with every particular which could be desired; and which the Doctor fully availed himself of. By pressing the valve when the stomach was full, its contents would flow out freely. When the stomach was nearly empty and quiescent, the interior of the cavity might be examined to the depth of five or six inches, if kept distended, by artificial means; and the food and drink might be seen entering it, if swallowed at this time.

We are indebted to Dr. Beaumont for many illustrations on this important subject. His experiments upon the various properties of the gastric juice, were continued for a great length of time, and from the favourable opportunity which he had, could not fail to render them correct. In order to show the chemical properties of the gastric juice thus obtained, I will only introduce the copy of a letter from Professor Dunglison, Professor of Chemistry in the Virginia University, to whom Dr. Beaumont had sent a portion for analysis.

"UNIVERSITY OF VIRGINIA,
February 6th, 1833.

"MY DEAR SIR:—

"Since I last wrote you, my friend and colleague, Professor Emmett, and myself, have examined the bottle of gastric fluid which I brought with me from Washington, and we have found it to contain free muriatic and acetic acid, phosphates and muriates, with bases of potassæ, soda, magnesia and lime, and an animal matter, soluble in cold water, but insoluble in hot. We were satisfied, you recollect, in Washington, that free muriatic acid was present, but I had no conception it existed to the amount met with in our experiments here. We distilled the gastric fluid, when the free acid passed over; the salts and animal matter remaining in the retort. The quantity of chloride of silver thrown down on the addition of the nitrate of silver, was astonishing."

Thus is perceived, that the gastric juice contains free muriatic acid, and if so, is it difficult to determine how it is that the food in the stomach is dissolved into fine particles. The experiment is easily made by placing a piece of meat in muriatic acid.

Having shown the constituents and actions of the principal fluids and solids of the body, let us lead the mind of the reader back to another most important principle then not fully explained—THE PRINCIPLE OF LIFE! We perceive the various organs to be compounded of the same materials of matter which surround us, and the powers which organize them are the known laws of nature. Then does life depend upon organization; and the result of certain organization is what we term life. All of which is independent of any *specific vital principle*, which ignorance and presumption have supposed to exist. As it respects vital principles, we may consider that there are many, but no one of them is indefinable or incompre-

hensible — they are the result of known and obvious laws.— Can a person live without lungs? No. Then are they a vital principle! Can he live without a brain? Then is that a vital principle! Can he live without a heart? Then is that a vital principle! Can he live without nerves? Then are they vital principles! and thus might we refer to every organ or fluid of the human body, and consider them as vital principles; but they are not indefinable vital principles; they are comprehensible! Yet neither is organization life! Every organ of the human body may exist in a state of perfection—yet that is not life. Notwithstanding, life cannot exist without this organization. Life yet depends on other existing laws, which must be brought into requisition before the great principle of life can be developed. The organization of man was thus perfect when first emanating from the hand of his creator; but it was not life, neither was it such until Deity "breathed into him the breath of life, and he became a living soul." Then are other laws in requisition to produce and support life! Can a man live without air? Can he live without food? Can he live without water? Thus it is perceived that life is the result of certain laws, and those the laws of Nature and no other. But those laws must act in concert, and in union with each other; and if one of them is violated, death as a necessary consequence follows. If any portion of the organization necessary for the maintenance of life, be rendered incapable of performing its requisite functions, or those organs be deprived of those agents which exist in either food, drink, or air, so absolutely and indispensably necessary for their sustenance, a cessation of their action takes place (which may be termed vital action) and that which we call death at once follows.

We must again request the reader to cast his eye back a few pages, where we contended, that animal matter was the pro-

duct of vegetable; and traced the growth of the human frame from infancy to manhood, showing that from the arterial blood by the constituents which it acquired, constantly nourished and supported the system, and that the arterial blood eventually entered the small capillaries, or blood vessels of the skin, from which it entered the veins and was again conveyed to the heart.

The important circumstance to be here related is the changes and actions, which under various circumstances can take place in animal matter. Heretofore we have only spoken of its formation, the powers by which it is formed and its composition when formed. That we are constantly subjected to change, every moment of our lives, from the cradle to the grave, the slightest observation furnishes the most conclusive evidence. Take an animal, or if you choose, let the most robust and corpulent individual be placed in a condition where he can obtain no more than sufficient food to sustain life, is it not evident that in such situation his flesh would all waste away, and he become a mere skeleton—then again permit him to partake of food, in the quantities required; is it not reasonable to conclude that he would again recover his flesh. Man may be compared to a stream of running water, like it, he is constantly passing away and as constantly resupplied; first by the agency of food, through the agency of the stomach; and secondly by oxygen and electricity, through the medium of the lungs. The same identical particles of matter which composed our system but yesterday, does not to day. The system is at all times constantly undergoing composition and decomposition. Philosophers have differed in their opinions respecting the time required to produce an entire change in the human body, some have computed the time at seven years, others again at four and even three; that is, that seven years ago, no portion of matter that now constitutes our frame, did then—nor will there seven years

hence any portions of matter, that now constitute our system constitute it at that time ; but all be decomposed and passed away, whilst its place is resupplied with new and other identical particles of matter. To determine this point, many experiments have been made, such as feeding an ox, madder &c., in which cases the bones themselves, have been found so far impregnated with the madder dye, that no chemical process employed could disengage the colour.

The specific actions in animals, which constitute this change, it is of the greatest importance to understand ,as upon those actions in a great degree, depends our philosophy, in the treatment of disease. When the decomposition in the human system progresses with too great rapidity, disease follows, as debility, exhaustion, an impoverished state of the system, &c. When not progressing with sufficient rapidity, then do accumulations take place, giving rise to plethora, fulness of the blood vessels, corpulency, dropsy, &c., which in their turn, produce debility and diseases of a more violent character. We here perceive a line of health, above which, we require not the aid of excitants, nor beneath which we require not the aid of sedatives. As to the specific actions, that can be produced upon animal matter, they are few. In this respect, animal matter does not differ from vegetable, except in character. Among all the diseases which flesh is heir to, and under any circumstance that can be named, or in any, or all the various diseases, which nosologists have swelled to the most inordinate number, there can be but *three direct actions.* Cullen makes the number of diseases 149, Macbride 180, Sauvages 315, Linnæus 326, Sagar 351, and Vogal swells the number to 560, whilst some modern authors undertake to show, that they exceed 700. Medical men seem to have been determined, to multiply the number of diseases to an incredible number, as if their popularity in a great degree, depended upon the dis-

covery of some new disease, and have exhausted their vocabulary in order to find a name by which they might christen, as they supposed, some new disease. This doctrine of numerous diseases, has led to the principles of different treatment for each disease, and the introduction of a vast variety of medicinal remedies ; and has likewise, most eminently subserved the purpose, of rendering the science much more prolix, indefinable and incomprehensible, which in all probability, might be a desirable circumstance with those whose interest it might be, to continue its mystification. But this doctrine of numerous diseases, has likewise led to the most incorrect principles in practice, from the very fact, that those symptoms which led to the opinion, that a new disease had made its appearance, was no other than the symptoms of a disease already existing, and thus, has it become the almost prevailing practice, to treat the symptoms of a disease as a distinct disease in itself; whilst the original organ diseased, and which produced the existing symptoms, was left unattended to, to pursue its course until the organ itself had become a mass of irrecoverable obstruction.

By contending, that but three direct actions can be produced upon animal matter, I do not wish to be misunderstood ; I do not mean to say, there are but three diseases. There are a number of different diseases, which are all different in character, and require different treatment; but they are far, very far, from being so numerous as the folly of some have supposed.

The first action that can be produced on animal matter, is irritation,which is succeeded by inflammation, and which is again succeeded by putrefaction. If I rub my hand it is irritation,which irritation produces inflammation, and which inflammation will produce decomposition, the formation of pus or putrefaction.— These actions are then taking place every moment of our lives. "What" says my learned and dignified opponent, "are we in a

state of putrefaction? Do you *presume* to say that the human body, while in a state of health, is undergoing putrefaction?" I did not say so, and had I, how far should I have been incorrect? I do not wish to be understood to say, that the principles of putrefaction are developed during life, any more than I would that a stream of running water is in a state of putrefaction; but it contains the principles of putrefaction, which are developed the instant it becomes a stagnant pool. So with the human body, whilst the heart continues to propel the blood through the system, putrefaction cannot be said in the sense which we understand it to have taken place, but so soon as this power and action is suspended, like the pond of stagnant water, putrefaction progresses with rapidity.

Although this decomposition is constantly taking place in the system, by which putrescent matter is continually forming; nature, in her wise designs, has kindly so organized us as to escape the difficulties arising therefrom, by constituting us with certain excretory organs, that this putrescent matter might be thrown from the system as fast as it is formed, in order that the fluids should not be contaminated with its deleterious properties. The principal and essential excretory organs are the skin, the bowels and kidneys. There are, notwithstanding, a vast many cases where those excretory organs, or some one of them, do not freely perform their office. When this happens, instead of the decomposed or putrescent matter being thrown from the system, as fast as it is formed, a portion of it at least is retained, and when retained, the veins being absorbing vessels, take it up, from which serious difficulties and disease may arise. In this way are fevers produced. In fever, the skin is dry, the bowels costive, the kidneys inefficiently perform their office. All the excretory organs are in a measure inactive—the change is partially suspended. But so soon as this change is again properly progressing—the instant we can produce

perspiration, and a healthy action of the excretory organs, fever is gone; then is this morbid or putrescent matter thrown off, and the system relieved from both the irritation and inflammation.

That the excretory organs in all cases of disease, should be duly attended to is of the utmost importance, and cannot be too strongly enforced. In consequence of one or the other, not duly performing its office, much mischief arises; the blood thus becoming impure, and carried to the liver, diseases that organ, which is more likely to become subjected to disease than any other, but in fact there are few organs, if any, that can escape its influence. A course pursued by many in regard to the excretions cannot be too strongly deprecated, and cannot, but in many cases produce extensive mischief; and although it in many cases may have been countenanced, and even recommended by distinguished practitioners, yet is nevertheless deserving of the strongest censure. I mean the extravagant use of cathartics, so generally in use, under the form of pills. Upon what principles of reasoning should we induce all the fluids of the body to the bowels? With equally strong objections would we also oppose that practice which is directly opposite, *steaming* or violent sudorifics, which induces all the fluids to the skin; or that practice which would induce all the fluids to the kidneys, by powerful diuretics. Each of the excretory organs, have their own respective duties to perform, and they are of a character only suitable to be performed by each respective organ, and when such organ is performing the duty which belongs to another, it cannot be done without much danger of producing an unfavourable result. Each respective organ, should perform its own proper office, and no more; this would be in accordance with the grand design of nature.

The action of the excretory organs has considerably engaged the minds of medical philosophers, with a view in seve-

ral instances, to ascertain the period of time required to bring about an entire change in the human system. We will here give an illustration of the experiments made upon the skin, by which the reader will readily recognize it to be of greater importance than he at first imagined. Sanctorius was the first individual who undertook to illustrate the amount of perspirable matter thrown from the skin in a given time. He continued his experiments on that subject for upwards of thirty years.—Subsequent experiments have been made by Dodart, in France, by Keil, in England, by Bryan, Robertson and Rye, in Ireland, and by Lining, in Carolina. The result of these experiments was collected by Haller; but they give no precise estimate of the amount of the transpiration, those philosophers not having distinguished between what was lost by the skin, and by the lungs. Lavoisier and Seguine, are the only philosophers who have attempted to ascertain the amount of perspirable matter thrown from the skin in a given time. They procured a bag composed of varnished silk, which was perfectly air tight, in which Seguine, who was usually the subject of experiment, was enclosed, and the bag was closed exactly over his head.—There was a slit in the bag opposite to his mouth, and the edges of this slit were accurately cemented round the mouth by means of a mixture of turpentine and pitch. Thus every thing emitted by the body was retained in the bag, except what made its escape from the lungs by respiration. By weighing himself in a very delicate balance at the commencement of the experiment, and again after he had continued for some time in the bag, the quantity of matter carried off by respiration, was ascertained. By weighing himself without this varnished covering, and repeating the operation after the same interval of time had elapsed as in the former experiment, he ascertained the loss of weight occasioned by perspiration and respiration. By subtracting from that sum the loss of weight indicated by

the first experiment, he obtained the quantity of matter which made its escape by perspiration in a given time, which was 52.89 ounces in twenty-four hours.

By this illustration, which is no doubt correct, it would appear, and especially the more so, when we take into account the amount of the other excretions, that the human body is much more rapidly undergoing change than the casual observer would suppose. Even the perspirable matter from the skin alone, according to this experiment, would in one year exceed 1200 pounds ; but it must be born in mind that there are various circumstances to be taken into consideration, and that the quantity perspired is increased by drink, but not by solid food ; that it is greatest in hot weather, and in hot climates, and after great exercise. And likewise when the quantity perspired is great, the quantity of urine is small, and *vice versa.* Perspiration is at its minimum immediately after a repast. It reaches its maximum during digestion.

The substances emitted from the skin by perspiration has been ascertained to be water, carbon, carbonic acid, phosphate of lime, and even urea, is sometimes emitted through the skin. The skin being so important a membrane in which the whole body is enveloped, and the office assigned to it involving immense interest as it regards health, we cannot pass over it without a partial consideration of its properties and office.— The skin consists of three distinct layers or membranes ; the outermost is termed scarf-skin, or cuticle, the second has no English name, but is known to anatomists by the *rete mucosum,* which gives the colour of the skin. The next is what is called the true skin. The nerves in the skin are very numerous, by which the sensation of feeling is imparted, and particularly at the ends of the fingers. The skin is likewise largely supplied with blood, which is constantly charging the capillary vessels, and from which large quantities of morbid, effete matter, the

impurities generated in the blood, are continually thrown, in the form of both sensible and insensible perspiration. For this purpose the skin is filled with innumerable pores, which by the disengagement of this effete matter in the form of sweat, often become charged and filled up, so that this perspirable matter cannot pass off in proper proportions ; and as previously shown in this way generate disease. The carbonic acid gas thrown off by the skin, is principally that portion termed insensible perspiration, but contains more or less oily substances, somewhat volatile, evinced by the fact that every animal has a peculiar smell, and is well known by the scent. A dog chained some hours after his master had set out on a journey of some hundred miles, followed his footsteps by the smell, and found him on the third day in the midst of a crowd. We are likewise aware that an oily matter collects on various parts of garments after having been worn for some time. When rubbed on paper, it makes it transparent, and hardens on it, like grease. It burns with a white flame, and leaves behind it a charry residium. Berthollet concluded that the acid of perspiration was phosphoric. Thenard alleged that he obtained acetic acid from it. But Berzelius supposed it was the lactic, and that in Thenard's experiments the acetic was formed at the expense of the lactic.

Fourcroy and Vauquelin ascertained that the scurf which collects on the skin of horses, consists chiefly of phosphate of lime, and urea is even sometimes mixed with it. Hence it would not be an improbable conclusion that the result was of a similar character with many individuals.

The next excretion which we shall consider, is the urine, which has attracted the attention of philosophers more than any other of them, from the circumstance of its being a source from which posphorous could be produced, which subject engaged

the attention of Boyle, Boerhaave, Haller, Haupt, Maugraff, Pott, Rouelle, Proust, Scheele, and Klaproth, each of whom successively improved the method of obtaining the phosphoric salts from urine. Fourcroy, Vauquelin, and Mr. Proust, have published quite elaborate analyses of the existence of several substances in urine, which had been overlooked by other chemical philosophers. But the most elaborate and exact analysis of urine, has been made by Berzelius. The constituents of healthy urine, according to his analysis, are as follows:

Water,	933.00
Urea,	30
Sulphate of potash,	3.71
Sulphate of soda,	3.16
Phosphate of soda,	2.94
Muriate of soda,	4.45
Phosphate of ammonia,	1.65
Muriate of ammonia.	1.50
Free lactic acid, lactate of ammonia, animal matter, soluble in alcohol, urea, not separable from the preceding together	17.14
Earthy phosphate with a trace of fluate of lime,	1.00
Uric acid,	1.00
Mucous of the bladder,	32
Silica,	0.03
	1000.00

In consequence of the quantity of gelatin or albumen which urine contains, as ascertained by Fourcroy and Vauquelin, urine putrefies sooner than any other substance, and exhales a most detestable odour. In some, putrefaction takes place as soon as voided; in others, scarcely any change appears for a number of days; there is a great difference in this respect. The new substances produced by the putrefaction of urine, are

ammonia, carbonic acid, and acetic acid; the ammonia may be distinctly recognized by the smell. Putrefied urine consists of ammonia, carbonate of ammonia, phosphate of ammonia, phosphate of magnesia and ammonica, urate of ammonia, acetate of ammonia, benzoate of ammonia, muriate of soda, muriate of ammonia; besides the precipitates, albumen and phosphate of lime. When urine is distilled, the products are water, containing ammonia and carbonate of ammonia, forming chrystals; the acids in it are saturated with ammonia; the gelatin and phosphate of lime precipitate. The heat produced by the distillation is sufficient to decompose the urea.

These are the properties and constituents of urine in a state of health; but this excretion is materially modified and changed in a state of disease, to illustrate which we will introduce the following observations.

1. In inflammatory diseases the urine is of a red colour, and peculiarly acrid; it deposites no sediment on standing, but with corrosive sublimate it yields a copious precipitate.

2. During jaundice, the urine has an orange-yellow colour, and communicates the same tint to linen. Muriatic acid renders this urine green, and thus detects the presence of a little bile.

From the experiments of Fourcroy and Vauquelin, we learn that urine sometimes in these cases contains a substance analagous to the yellow matter which they formed by the action of nitric acid on muscular fibres.

3. About the end of inflammatory diseases, the urine becomes abundant and deposites a copious pink-coloured sediment, composed of rosacic acid, a little phosphate of lime and uric acid.

4. During hysterical paroxysms, the urine usually flows abundantly. It is limpid and colourless, containing much salt, but scarcely any urea or gelatin.

5. Mr. Berthollet observed that the urine of gouty persons contains usually much less phosphoric acid than healthy urine. But during a gouty paroxysm it contains much more phosphoric acid than usual, though not more than constantly exists in healthy urine.

6. In general dropsy, the urine is loaded with albumen, and becomes milky, or even coagulates when heated, or at least when acids are mixed with it. In dropsy from diseased liver, no albumen is present ; the urine is scanty, high coloured, and deposits the pink-coloured sediment.

In certain cases, females have been observed to pass urine which had the appearance of milk, and which upon examination, proved to differ from common urine, in containing a notable proportion of the curdy part of milk.

7. In dyspepsia, the urine always yields a copious precipitate with tan, and putrefies rapidly.

8. The urine of rickety patients is said to be loaded with phosphate of lime, or, according to others, with oxalate of lime.

9. Mr. Rose has ascertained that in chronic hepatitis the urine is destitute of urea. This curious fact has been confirmed by the experiments of Dr. Henry.

10. In diabetes the urine is sweet tasted, and often loaded with saccharine matter. In one case, the urine emitted daily by a diabetic patient according to the experiments of Cruickshanks, contained 29 ounces of sugar.

We hence perceive that urine in a great degree, may exhibit the character of disease. Its disposition to speedily run into putrefaction, always shows an unhealthy state of the system, and even in many instances, the specific character of a disease. There are those who altogether determine the character of a disease by the observations which they are capable of making

upon this fluid. A superabundance of albumen in urine always indicates some defect in the powers of digestion.

Urine is one great source by which the decomposed and putrescent matter is carried from the system, and must necessarily therefore contain the products formed from the decomposition constantly taking place. It is one of the most important agents for the purification of the blood. As the urine is increased by drink, and the rapidity with which it is formed after drinking, has induced many anatomists to suppose that there was some direct conduit by which the water drank was immediately conveyed from the stomach to the kidneys, other than passing through the blood. When either of those important excretory organs, the skin, the bowels, or kidneys, act inefficiently, the labour of another is increased; thus when the action of the skin is deficient, the action of the kidneys is increased, as in cold weather, the action of the skin is less, and the kidneys greater. In warm weather, the skin greater and the kidneys less; and again, it is frequently the case when the bowels are costive, the kidneys are very free.

The kidneys are situated on each side of the spine behind the peritoneum, opposite to the two lower vertebra of the back. The right kidney is somewhat lower than the left, and nearly in contact with the liver; the right lobe of which overlaps the kidney. The external portion of the kidneys is full of small blood vessels. The kidneys are constantly largely supplied with blood; in fact, it appears evident, that the whole blood in the body, frequently passes through the kidneys. The artery supplying the kidneys, is a branch of the aorta. The emulgent vein from the kidneys, evacuates its blood into the ascending vena cava. Anatomists have ever considered the action of the kidneys inscrutable, by what means, and by what process, the water was separated in the kidneys, has been impossible to comprehend; and finally, have satisfied themselves by attributing it to an incomprehensible something; a power

which was indefinable—the specific action of their archeus, vital principle, &c. The same principle of action, is required by the kidneys, to separate the water from the blood, as is required to produce any other secretion or excretion; as the gastric juice, the bile &c. We have before illustrated the general principles, how both the secretions and excretions are produced, and shall here refer particularly to the kidneys, which, as we there stated, was connected with the spleen by the organic nerves, and all anatomists admit, that the kidneys receive branches of nerves from what they term the great sympathetic nerve. In order to establish our position yet more conclusively, we will extract the following statements from Hooper, in respect to the *renal glands*. "Renal capsule. Supra-renal glands. The supra-renal glands are two hollow bodies, like glands in fabric, and placed one on each side upon the kidneys. They are covered by a double tunic, and their cavities are filled with a liquor of a brownish colour. Their figure triangular; and they are larger in the fœtus than the kidneys: but in adults, they are less than the kidneys. The right is affixed to the liver, the left to the spleen and pancreas, and both to the diaphragm and kidneys. They have arteries, veins, lymphatics, and nerves; their arteries arise from the diaphragmatic, the aorta, and renal arteries. The vein of the right supra-renal gland, empties itself into the vena cava; that of the left into the renal vein; their lymphatic vessels go directly into the thoracic duct; they have nerves common alike to these glands and the kidneys. They have no excretory duct, and their use is at present unknown. It is supposed they answer one use in the fœtus, and another in the adult, but what these uses are, is uncertain. Boerhaave supposed their use to consist in their furnishing lymph to dilute the blood returned, after the secretion of the urine in the renal vein; but this is very improbable, since the vein of the right supra-renal

gland goes to the vena cava, and the blood carried back by the renal vein wants no dilution. It has also been said, that these glands not only prepare lymph, by which the blood is fitted for the nutrition of the delicate fœtus; but that in adults, they serve to restore to the blood of the vena cava, the irritable parts, which it loses by the secretion of bile and urine. Some, again, have considered them as diverticular in the fœtus, to divert the blood from the kidneys, and lessen the quantity of urine. The celebrated Morgagni believed their office to consist in conveying something to the thoracic duct. It is singular, that in children who are borne without the cerebrum, these glands are extremely small, and sometimes wanting."

If this statement contained all the knowledge we possessed upon the subject, it would be amply sufficient to illustrate and confirm our whole position. The renal glands, although they have no excretory duct, are connected with the liver, spleen, and pancreas, and to the diaphragm and kidneys. Both of the renal glands have their arteries, veins, lymphatics and nerves, and their cavities are filled with a liquor of a brownish red colour, evincing at once the commencement of the process of separating the urine from the blood, and the direct connection with the several organs above named, shows the various sources from which the blood is drawn for this purification; and likewise accounts for the reason why the water from the stomach is so quickly conveyed to the kidneys.—That their structure and action are connected with the organic nervous system, is plainly evinced by the fact, that in children born without the brain, these glands are extremely small and sometimes wanting, and where the foetus is perfect, those glands are larger than the kidneys, showing even that these glands are formed in the foetus before the brain or kidneys;—yet with all these facts before them anatomists have decided their uses to be unknown.

Before we quit these illustrations, we will make a few observations upon the formation of *morbid concretions*, such as are usually called *ossifications* and *calculi* which frequently produce excruciating pain and suffering, which can only be obviated by removing the cause.

Small concretions like sand are sometimes found lodged in what is called the *pineal gland* of the brain. Dr. Wallaston analyzed them and found them to consist principally of phosphate of lime.

Small concretions sometimes make their appearance in the salivary glands which have been examined by Wallaston, Fourcroy and Bostock, and found to consist of phosphate of lime and coagulated albumen.

In some forms of Pulmonary Consumption, particularly tuberculous, persons are known to cough up small, rounded, hard and white concretions. These concretions have been examined by Fourcroy, Henry and Thompson, who found them composed of phosphate of lime, united to a thick membraneous substance. Mr. Crumpton examined some which were composed of carbonate of lime united with animal matter.

Concretions sometimes form in the liver, called hepatic concretions. They were examined by Thompson and found to consist of phosphate of lime and a tough animal membraneous matter.

Hard bodies sometimes form in the gall bladder and bile duct, which are called *biliary concretions, biliary calculi, gall stones, &c.*, which have been described by different anatomists. The accounts generally given of them previous to 1764, were collected by Haller, which he published to the world. Since his time, new facts have been discovered by Fourcroy, Gren and Saunders, and also by Thenard, who subjected them to analysis. Chemists have divided them into four different classes, but there appears little necessity for this, as they are gen-

erally of the same constituents as the bile, and are formed by the bile itself, becoming viscid, hard and indurated. Sometimes they assume a variety of shapes, as oval, sharp, &c. and of different sizes, so large sometimes, as to prevent their passage through the bile duct, giving much distress, and even sometimes terminating fatally. In one instance, I had a patient who after passing a large quantity of biliary calculi of this character, it was followed by a large quantity of coagulated bile of a brilliant green tinge of hard consistence, and in pieces from two to three inches long, and from an inch to half an inch in diameter; which, being exposed to the air for two or three hours, became soft and watery; this last occurrence, I attributed to the agent which I made use of, to dissolve them previous to evacuating them.

Concretions are not unfrequently formed in the bladder and other urinary organs, called *urinary calculi*, which produce the most dismal diseases, to which the human system is liable. Paracelsus alleged, that calculi were composed of mucilaginous tartar, which floated in the blood vessels. The opponents of his system at that time, considered them as a peculiar mucilage, concocted and petrified by the heat of the body. Von Helmont, refuted those opinions and made the first attempt at their analysis; he demonstrated that the materials constituting calculi existed in urine. Several chemical philosophers, have laboured to illustrate the properties of calculi; as Boyle, Boerhaave, Slare, Hales, Whytt, Alston, and Black. In 1776, Scheele and Bergman removed much uncertainty, which hung over the subject, by ascertaining the nature of calculi, which they subjected to examination. Since which time, more additional light has been thrown upon it, by the labours of Austin, Walker, Brugnatalli, Pearson and others. After which Wollaston pointed out several new constituents which had not been suspected before. Subsequently Fourcroy and Vauquelin

analyzed about 500 calculi, with precision, detecting some substances which had not been discovered before. Mr. Brande, likewise examined 150 calculi, rectifying some mistakes, and adding several new facts.

Urinary calculi are usually spheroidal or egg shaped; sometimes they resemble a cluster of mulberries. The size of the calculi is various, sometimes they are very small, and sometimes as large as a goose egg, or larger. Their colour is various, sometimes of a deep brown, resembling the colour of wood, others again are white, resembling chalk—others are hard and of a dark grey colour. These various colours are often intermixed, and are of different degrees of intensity. The surface of some of them is polished like marble, others are rough and unequal—and others again are covered with semi-transparent chrystals.

The substances which have been discovered in urinary calculi, are uric acid, phosphate of lime, phosphate of magnesia and ammonia, oxalate of lime, muriate of ammonia, magnesia, phosphate of iron, silica, urea, cistic acid and mucous. All calculi contain more or less animal matter, and serve the purpose of a cement to glue the other ingredients together, it is sometimes in very small quantities, at other times considerable. It was ascertained to be mucous by Fourcroy and Vauquelin.

Gouty concretions appear from the analysis made by Wollaston to be composed of uric acid and soda.

We have now in a somewhat limited degree given the chemical constituents of the human body; shown its actions, and its changes. The laws of nature are always the same—they never change—the same chemical constituents which form the human body at this day, have ever been its constituents since the first formation of our species, and must forever remain such. They were ever compounded according to cer-

tain existing laws, and always comprised of the same proportion of ingredients; they could form in no other way, and could they, it would not form the particular article, as bone, &c.; it would be some other substance. The principle by which the various substances are separated from the blood to form the solids, as bone, muscle, cartilage, &c., is called assimilation, and over which authors observe, "the thickest darkness hangs." We have more than once referred to this subject, throughout our work, and even illustrated it; but in order to render it somewhat more comprehensive, we again take notice of it under the character of assimilation. The facts regarding assimilation, have accumulated in sufficient numbers, to show conclusively, the existence of such a process; the healing of a fractured bone or wound, is proof of the existence of such principle.

"Every organ employed in assimilation has a peculiar office; and it always performs this office whenever it has materials to act upon, even when the performance of it is contrary to the interest of the animal. Thus the stomach always converts food into chyme, even when the food is of such a nature that the process of digestion will be retarded rather than promoted by the change. If warm milk, for instance, or warm blood, be thrown into the stomach, they are always decomposed by that organ, and converted into chyme; yet these substances are much more nearly assimilated to the animal before the action of the stomach than after it. The same thing happens when we eat animal food."

"On the other hand, a substance introduced into an organ employed in assimilation, if it has undergone precisely the change which that organ is fitted to produce, is not acted upon by that organ, but passed on unaltered to the next assimilating organ. Thus it is the office of the intestines to convert chyme into chyle. Accordingly, whenever chyme is introduced into

the intestines, they perform their office, and produce the usual change ; but if chyle itself be introduced into the intestines, it is absorbed by the lacteals without alteration. The experiment, indeed, has not been tried with true chyle, because it is scarcely possible to procure it in sufficient quantity ; but when milk, which resembles chyle pretty accurately, is thrown into the jejunum, it is absorbed unchanged by the lacteals."

" Again, the office of the blood-vessels, as assimilating organs is to convert the chyle into blood. Chyle accordingly cannot be introduced into the arteries without undergoing that change ; but blood may be introduced from another animal without any injury, and consequently without undergoing any change. This experiment was first made by Lower, and it has since been very often repeated."

" Also, if a piece of fresh muscular flesh be applied to the muscle of an animal, they adhere and incorporate without any change, as has been sufficiently established by the experiments of Mr. John Hunter ; and Buneva has ascertained, that fresh bone may, in the same manner be engrafted on bones of animals of the same or different species."

" In short it seems to hold, at least as far as experiments have hitherto been made, that foreign substances may be incorporated with those of the body, provided they be precisely of the same kind with those to which they are added, whether fluid or solid. Thus chyle may be mixed with chyle, blood with blood, muscle with muscle, and bone with bone."

It can hardly be doubted that this same principle extends itself to all the animal substances, even to the nerves. In the nerves, however, we have the illustration of a still more important action, which conclusively illustrates that it is the power of *electricity* which governs the nervous action. When a nerve is cut, the sensibility of the part into which it enters is lost, but although a portion of nerve for some inches may be

taken out and the connection and sensibility thus completely destroyed between the parts; it may be as completely again restored, by introducing a wire which shall intimately connect itself with the two ends of the nerve thus separated. This is not a new idea—it has been done. If any thing more is wanting to evince that the nerves are governed by electrical action, we are at a loss to know what it is. But on the other hand, when substances are introduced into any part of the body, which are not the same with that part, nor the same with the substance upon which that part acts (the nerves as above excepted) provided they cannot be thrown out readily, they destroy the part, and perhaps even the animal. Thus some substances introduced into the blood very soon prove fatal;—and introduced into wounds of the flesh or bones, prevent them from healing.

"Although the different assimilating organs have the power of changing certain substances into others, and of throwing out the useless ingredients, yet this power is not absolute even when the substances on which they act, are proper for undergoing the change which the organs produce. Thus the stomach converts food into chyme, the intestines chyme into chyle, and the substances which have not been converted into chyle, are thrown out of the body. If there happen to be present in the stomach and intestines any substance which, though incapable of undergoing these changes, at least by the action of the stomach and intestines, yet has a strong affinity, either for the whole chyme and chyle, or for some particular part of it, and no affinity for the substances which are thrown out, that substance passes along with the chyle, and in many cases continues to remain chemically combined with the substance to which it is united in the stomach, even after that substance has been completely assimilated, and made a part of the body of the animal. Thus there is a strong affinity between the col-

ouring matter of madder and phosphate of lime. Accordingly, when madder is taken into the stomach, it combines with the phosphate of lime of the food, passes with it through the lacteals and bloodvessels, and is deposited with it in the bones, as was proved by the experiments of Bechier and Duhamel. In the same manner, musk, indigo, &c., when taken into the stomach make their way into many of the secretions."

" These facts show us that assimilation is a chemical process from beginning to end ; that all the changes are produced according to the laws of chemistry ; and that we can even derange the regularity of the process by introducing substances whose mutual affinities are too strong for the organs to overcome.

"It cannot be denied, then, that the assimilation of food consits merely in a certain number of chemical decompositions which that food undergoes, and the consequent formation of certain new compounds. But are the agents employed in assimilation merely chemical agents ? We cannot produce any thing like these changes on the food out of the body, and therefore we must allow that they are the consequence of the action of the animal organs. But this action, it may be said, is merely the secretion of particular juices which has the property of inducing the wished-for change upon the food ; and this very change would be produced out of the body provided we could procure these substances ; and apply them in proper quantity to the food. If this supposition be true, the specific action of the vessels consists in the secretion of certain substances ;— consequently the cause of this secretion is the real agent in assimilation. Now, can the cause of this secretion be shown to be merely a chemical agent ?" We shall only answer—It is produced by the power of electricity, affinity and attraction.

As the human body is then composed of certain constituents, such as we are acquainted with ; such as constantly sur-

round us, and they united together by certain laws, by which those constituents are constantly governed, and those laws natural laws, the study of which can render us familiar with their operation, both in the formation of the human frame, its constant changes and decompositions; every circumstance to which animal matter can be subjected. Is it not therefore, an indispensable requsite, for him who undertakes to cure disease to become perfectly acquainted with all the laws governing animal matter; the chemical constituents of animal matter, both as it regards a state of perfect health and disease; to know by what powers, processes and combinations the human body is formed—what the chemical chages are, may be, or can be—and how produced? Is the attainment of this knowledge to be denominated quackery? We cannot but consider the want of it, to be quackery; the very essentials of *quack practice.* It is knowledge which we seek to advance—it is science—not ignorance—it is to render the treatment of disease more efficient, more certain, not an experimental practice, but one founded on science; and one of that perfection, that scarcely if ever can err; one which will enable the practitioner to determine with certainty the character and nature of a disease; and the difficulty or morbid matter with which he may have to contend; what that morbid matter is, and the direct knowledge of the agent, necessary to employ to decompose and render harmless such morbid matter, and carry it from the system. The physician should know, whilst preparing his medicine in a mortar, the direct action it would have upon his patient, as well as after he had witnessed its operation. This is not the case now—no such knowledge at this day appears to be possessed by the medical profession; it is all but a mere principle of experiment; the reason why a medicinal agent acts, thus, or so, appears utterly incognizable; it is merely a matter of guess. Were we in possession of the true principles, all those violent, harsh, ex-

hausting and depleting agents would be abandoned—a man would no longer be made sick, to make him well—agents would no longer be directed against the constitution—against the healthy portions of the system—physicians would distinguish between healthy and diseased matter, and would learn how to neutralize, and render harmless this morbid action; their remedies would be directed against the diseased part, not promiscuously acting upon the healthy, as well as upon the diseased portions of the system; they would act on the disease, not on the system.

The want of this knowledge, has led to the employment of most destructive agents, but, how those agents act, or why they act, none have defined. They have been left involved in mystery, being satisfied that they acted as cathartics, sudorifics, &c. without enquiring further whether their other effects were beneficial or injurious. The effects and direct chemical actions of medicines and remedies, now most generally resorted to, we will next endeavour in some measure, to illustrate.

As we resort to vegetable remedies and them alone, for the treatment of disease, disclaiming in the most decided manner against the use of any mineral or metallic agent whatever, either internally or externally, we shall commence our illustrations on this head, with what the medical faculty call their "herculian remedy"—the "Sampson of medicine," which, by the by, has been of greater injury to the constitutions and lives of mankind than any other which quackery has ever introduced into the practice.

Mercury as appears in our history, was first introduced into practice by that noted empiric Paracelsus, in the sixteenth century, upwards of 320 years ago; and at this day, there is scarcely a country on earth, where it is not resorted to. The use of it has become so extensive, as to be an important arti-

cle of commerce ; some governments even derive their principal revenue from this source. The extensive use made of it as an article of medicine in warm climates, is surprising, not unfrequently are 100 grains or more administered at one single dose, and its use has been almost indiscriminately extended to every bodily or mental malady, yet no one, thus far, has been able or has even presumed to give us any thing but the merest conjecture upon the question, how it operates. They know it produces salivation, but how, or why, they appear perfectly ignorant of.—Of the most learned authors, who have hitherto written upon it, many of them evade the question altogether, whilst those who *do* refer to it, consider its action utterly indefinable, or refer it to the "vital principle." Cullen observes, "that it acts as a stimulus to every sensible or moving fibre of the human body, but what the peculiar excitement which it produces may be, "he says," it is in vain to enquire." We may ransack volume after volume of medical history, and are met by similar language. In the United States Dispensatory, a work published periodically and designed for the express use and information of the physician, student, and apothecary—a work supposed to contain all the knowledge, heretofore acquired on the direct action of every article made use of, for the treatment of disease—the text book of the whole medical profession, and in which the compilers avail themselves of all the advantages and information, they can derive from the dispensatories of other countries. What information do we derive from it, in respect to this article? Let the reader judge from the following quotation, under the head of the "*Medical properties of Mercury.*" Of the *modus operandi of mercury we know nothing, except that it probably acts through the medium of the circulation, and that it possesses a peculiar alterative power over the vital functions, which enables it, in many cases to subvert diseased actions, by substituting its own in their*

stead." Here then is the concentrated knowledge of the great science of medicine. The constant and most extravagant use of one of the most deleterious articles, for upwards of three hundred years, without knowing its specific action! Is it science, or is it quackery? The reader must judge—it is the "blind leading the blind." Gentlemen will say it will produce salivation—they will admit that it will rot out teeth—that it will produce exfoliation of the bones, produce debility, ulcers, eruptions, &c. But how? Why does it do so? Oh! We can't tell that. "Modus operandi of mercury we know nothing," and yet, you are learned and scientific doctors and constantly prescribe it.

The usual forms in which the preparations of mercury are used at the present, are.

1st. Blue Pill. The component elements, of the active ingredients in this preparation, are mercury and oxygen, in the form of an oxide of mercury. It is prepared by rubbing together quicksilver, conserve of roses and liquorice powder, until the globules disappear, and the metal by combining with the oxygen of the viscid substance, becomes converted into the black oxide. This the mildest form in which mercury is used.

2d. Mercurial Ointment. This is prepared by rubbing in a mortar, quicksilver and lard, until the globules disappear, by which process, the mercury is oxidized, and the black oxide of mercury is thence likewise formed.

3d. Corrosive Sublimate. This is the most active preparation of the metal. It is composed of muriatic acid and mercury.

4th. Calomel. This is the most common form in which mercury is administered. This also is formed by muriatic acid combined with mercury.

The great difference in the activity of these two last articles depends upon the greater quantity of the acid, or degree of

oxidizement of the mercury in the corrosive sublimate than the calomel. By those chemists who adopt the theory of chlorine, these preparations are considered to be the perchloride, and the proto-chloride of mercury, that is, the former having two proportions of chlorine and the latter one.

5th. Red Precipitate. This is composed of nitric acid and mercury.

6th. White Precipitate. Composed of mercury, muriatic acid and ammonia.

7th. Cinnibar, constituted of two parts of sulphur and one of mercury.

8th. Æthiop's Mineral, constituted of one part sulphur and one part mercury.

9th. Turpeth Mineral, formed of sulphuric acid and mercury.

There are some other mercurial salts which have been introduced into practice, yet are seldom used, as the

10th. Acetate of Mercury, composed of acetic acid (vinegar) and mercury.

11th. Phosphate of Mercury, formed by phosphoric acid and mercury.

12th. Prussiate of Mercury, formed by prussic acid and murcury.

All the preparations of mercury produce the same general or specific effects upon the human system, differing however somewhat in time and degree in each, and each produces some particular effects peculiar to itself. They are all alike capable of producing salivation, exfoliation of the bones, and that state or condition of things which physicians have called "the mercurial action." Calomel purges most easily, corrosive sublimate and turpeth mineral vomit most readily, while the sensible actions of cinnibar and Æthiop's mineral are comparatively weak.

The particular effects of the several preparations of mercury are perfectly explicable upon a due consideration of their chemical constituents, and the requsite knowledge of the constituents of animal matter. The sensible activity of these preparations bear a relation to the degree of oxidizement, that is the amount of oxygen with which the metal is combined.

In order to clearly understand the exposition we are now to give, it is necessary to keep in view the following facts :—

1st. In whatever soluble form the usual preparations of mercury are introduced into the stomach, they are reduced to an oxide of the metal previous to being absorbed into the system.

2d. Most acids are capable of combining with all the oxides of mercury.

3d. Phosphoric acid pervades almost every fluid and solid of the human body, and is more abundant than any other acid.

4th. Phosphoric acid and lime in the form of phosphate of lime, constitute the greater part of the composition of human bones.

5th. Phosphoric acid does not act upon mercury, but combines with its oxide, forming phosphate of mercury.

6th. Phosphorus acid (differs from phosphoric acid in containing one proportion less of oxygen,) decomposes all the oxides and salts of mercury—separating the mercury in its metallic state.

7th. Human bile which is secreted by the liver, is composed of water, albumen, picromel, muriate of soda, phosphate of soda, phosphate of lime, and soda and lime uncombined with any acid—hence the chemical character of the bile is alkaline.

8th. Saliva (secreted by the glands of the mouth) is composed of water mucous, a peculiar animal matter, alkaline muriates, lactate of soda, and pure soda.

When mercury has been taken into the stomach—say, for example, a dose of calomel—as soon as it passes through the lower orifice of the stomach [the pylorus] into the duodenum [the first intestine] it comes in contact with the bile, which is discharged from the liver into the bowels at this point. Here a mutual decomposition takes place, both of the sub-muriate of mercury, and phosphate of lime of the bile, upon the principle called in chemical language, electric affinity. Thus, both the soda and the lime have a stronger affinity [chemical attraction] for the muriatic acid of the calomel, than the affinity existing between the muriatic acid and the mercury. Hence, the soda and lime combine with the muriatic acid, forming muriate of soda [common salt] and muriate of lime, while a portion of phosphoric acid is set free by a decomposition of the phosphate of lime; and the mercury, by losing its acid, is reduced to an oxide. This is not only proved by chemical laws, but also confirmed by physiological facts. Whenever a cathartic effect is produced upon the bowels by any preparation of mercury, whether given in the form of a salt as calomel, or an oxide, as blue pill, and anguintum, or in a candied electuary, as in peppermint worm lozenges—the discharges from the bowels are invariably dark coloured, like the black or gray oxide of mercury.

In the form of an oxide, then, we are to consider mercury as being taken up by the absorbents, and carried into the mass of blood, to be thence circulated to every part of the system.—But at this stage of our enquiry, we are met by a long array of names learned in the sciences of chemistry and physiology, who stoutly deny that mercury is, or ever can be absorbed into the system at all. But from this denial, our readers may learn how much there is for men of learning yet to learn.—They support this non-absorption theory by supposing [we say supposing—for they cannot prove] the time-honored VITAL

PRINCIPLE has the requisite intelligent or other mysterious property, of refusing to take such passengers as are of noxious quality into the absorbing vessels ; or if they pertinaciously attempt to "force a passage," the next "conglobate gland," located in advance of the approaching enemy, "takes on inflammation," thus obstructing its own vascular conduits, so that the foe is obliged to stop. The noxious material is then decomposed by the same ever ready, and very convenient vital principle ; but what ever becomes of its elements they do not tell us. We wonder if a substance, when decomposed goes into a state of non-existence.

On our side of the question, viz: that the oxide of mercury is absorbed and carried into the system, we have also a long array of the names of chemical and physiological writers, to which we can add no inconsiderable force of another kind of testimony, that of stubborn facts. If we were to adopt the internal use of mercury, we would certainly adopt the theory of solidism, and say that it operates by producing "an impression upon the stomach, and the article then passes off by the bowels; but the impression is conveyed by sympathy [another *convenient* notion] to all parts of the system. We should readily perceive that our patients would much rather have the *impression* of the mercury circulating through the system than the *thing itself.* But as we cannot give the article, and trust to the vital principle to regulate the consequences, we have concluded not to use it at all. Dr. Chapman, in his Elements of Therapeutics, seems to think the idea that mercury enters into the circulating fluids, perfectly absurd. We think Dr. Chapman, upon this subject, is perfectly mistaken. But we will now follow the oxide of mercury in its course, and see if we cannot demonstrate its existence by its effects in other parts of the system than the stomach and bowels.

After a dose of calomel has been repeated a certain number of times, the gums become red, swollen, and tender, the tongue red and enlarged, the teeth loose, ulcerated matter is deposited upon the edges of the gums of a whitish, fleecy appearance; there is a brassy, copperish or metallic taste in the mouth, a fœtid putrescent breath, and a copious discharge of saliva. If the salivation does not stop here, the teeth, bones of the jaw, palate and nose, or of the cranium become carious or decomposed, deep ulcers are formed in the gums, throat or cheeks, attended with fœted, and sometimes bloody, ichorous discharges. Now if the oxide of mercury does not actually come in contact with the salivary glands, gums, throat, &c., how is it possible these changes can occur? Are these changes vital or chemical? A fœted breath can only be produced by putrescency; putrescency can only be produced by decomposition; decomposition is the separation from each other of the constituents of any substance: hence it is a chemical change. Whence occurs the metallic taste in the mouth except by a contact of the nerves of taste with the oxide of mercury? How is exfoliation of the bones produced? We have already stated the constituents in part of bone. The oxide of mercury combines with the phosphoric acid of the bones, forming a phosphate of mercury, leaving the bone in the state of an oxide of calcium, which is our common lime:—hence the boney structure being chemically decomposed, crumbles and exfoliates. Thus we say, in familiar language, mercury rots the teeth. We will now illustrate another problem in chemical science. Some anatomists have found pure mercury, in its metallic state, in various parts of the human system—in the brain, in the joints, between the tables of the skull, in the cells of the cylindrical bones, &c. Some writers upon theory have asserted this to be impossible. Other dissectors have again asserted it, and other theorists have again

denied it. That mercury has been thus found is unquestionable. To understand how it may be produced there, is not difficult, by opening to our sixth proposition. Phosphorous acid may be produced by any element capable of abstracting from phosphoric acid a part of its oxygen. Phosphorous acid being thus formed, and coming in contact with the oxide or any other combination of mercury, will precipitate it, that is, separate the mercury in its metallic state, and in this state it may remain any indefinite period of time.—This also affords a clue to an understanding of the statement made by Dr. Goldsmith in his natural history, that those miners who have been condemned to labor for life in mines abounding in mercurial ores, often "transpire quicksilver at every pore" before death releases them from their sufferings. The oxide of mercury is capable of producing decomposition to some extent in every fluid or solid of the human body. By combining with the phosphoric acid of the nervous fluid it decomposes that also; hence result all that train of symptoms attendant upon a mercurial course called nervous debility, nervous irritation, &c.

We wish now to propound a question for the particular consideration of the Medical Faculty. It is this:

Does it not often happen, by the destruction of the Nervous fluid, consequent upon a long continued course of Mercury, that the patient sometimes sinks suddenly, unexpectedly, and in a manner somewhat analagous to a fatal shock of electricity, or of the Leyden Jar?

To call attention to this subject, we must quote from Dr. Chapman's Therapeutics, page 361, vol. 2, as follows:

"Mercury, owing to some unintelligible cause, operates occasionally *as a poison*, inducing effects totally different from its ordinary agency, as a remedy; and which seem not at all influenced by the quantity taken, or the severity of the salivation. Though the mode in which it displays this deleterious operation,

is not uniform, it generally appears in the shape of what has been denominated erethismus, by Mr. Pearson. As in most instances of poisoning, there is here a sudden and sometimes unexpected prostration of strength, attended by anxiety about the pericardium, irregular action of the heart, small, quick pulse, occasional vomiting, nervous tremours, pale, contracted countenance, sense of coldness, &c. In this state, a very slight exertion such as attempting to walk, or rise from bed, will sometimes *instantly prove fatal.*"

Dr. Paris, in his Pharmacologia, in speaking of Calomel, says, "It is a singular fact, that children bear larger doses than adults."

Dr. Robinson says, "The mouths and gums of children are more liable to run into gangrene (mortification) from the use of calomel, than adults. These things are true, but not so very singular as to be inexplicable. The greater facility with which excrementitious or noxious matter is eliminated from the excretory organs, particularly the skin in children, accounts for the former fact. Yet this by no means proves, that all the calomel administered to children is disposed of in this way. The latter circumstance again demonstrates the absurdity of the vital principle of medical theories, for if this principle exists as a conservative of health, it is contrary to all natural phenomena, to suppose it less vigorous or less capable of resisting putrefaction or gangrene, in young than in older subjects."

We come now to the remedial effects of mercury. The various conjectures which have been offered upon this subject in medical books may be resolved into the following, viz:

1st. That mercury acts as a remedy by producing a general and permanent stimulus in every part of the system.

2d. That it subverts morbid actions by substituting its own peculiar action in their stead.

These ideas have been expressed in other words, by some, as—

It operates by imparting oxygen to the system. It produces a general change in the condition or action of the absorbents and secernments incompatible with the existence of the diseased action, &c.

That mercury does overcome some morbid conditions, by substituting, or rather producing a different one, we admit.

That its effects sometimes aggravate a disease is also admitted by all; and our exposition of its modus operandi affords the key to an understanding of these things. We admit that a cathartic dose of calomel usually relieves the bowels of their contents, and is followed by a disappearance of the symptoms of obstruction in the bowels.

But does the calomel in this case *all* pass off by the bowels, in every case, or even in any case? If it does, why is it that upon "catching cold," or drinking cold water, or acids, sometime the next day, a sore mouth is frequently the result? Why is it that salivation sometimes occurs days, weeks, months, even years after taking mercury?

Perhaps there is not a more important subject that can be suggested to the consideration of the medical profession, than the influence of salivation in fevers in overcoming those diseases. Authorities are at all points of the compass respecting the particular kind of fever in which salivation is most beneficial or at least injurious; but it seems to be a kind of maxim in the science, that where salivation can be produced in any fever the patient will get well.

Though there are abundant exceptions to this rule, yet we are willing to admit it as a general rule, and that too, upon an explanation afforded by Dr. Chapman. (Elements of Therapeutics, page 304, vol. 2.) He says, "When the yellow fever occured among us, (in Philadelphia,) the same practice, so far

as relates to the copious use of mercury, was instituted. It was applied as well to evacuate the bowels copiously as to excite salivation. At first this plan was deemed so singularly efficacious, that, in the enthusiasm of the moment, it was proclaimed that death never took place after mercury evinced its effects. But a sober and more deliberate observation soon exposed the illusion, and the propriety of the practice became universally distrusted. It appeared that mild cases of the disease were cured without it, and when violent, so rapid was their career that death took place long before the system could be brought under the mercurial impression." It is well known by most physicians, that in what are called malignant or low fevers, mercury will not salivate, or at least not until the virulence of the disease abates. Now if there is a vital principle to resist the absorption of mercury into the system, the reverse ought to be the case, as in low diseases the vital principle ought to be less capable of opposing its passage than in a state of greater vital energy. We here wish to propose another question for the consideration of medical men, viz: does any fever form a crisis in consequence of salivation taking place, or does salivation take place in consequence of a subsidence of the fever? Which is cause, and which effect? We take the latter side of the proposition.

Of the evils resulting from the mercurial practice, authors have noticed several which are characterized by such an assemblage of symptoms as to have received the appellation of mercurial diseases; as mercurial erythismus, mercurial eczœma, mercurial opthalmia, mercurial rheumatism, &c.

This last is much more common than most people suspect. Indeed there is reason to believe that a majority of the rheumatic diseases we meet with are of mercurial origin. Most persons are aware that children in consequence of taking cold after using mercurial ointment for some cutaneous disease, are

frequently troubled with pains, swelling and stiffness of the joints, resembling, and indeed usually called a rheumatic affection.

A great variety of circumstances determine the particular quality of the morbid condition mercury produces in any given case, as well as the particular part of the system in which such condition is manifested. Thus if while using it, a free perspiration is kept up by diaphoretics, its effects upon the skin and its functions would be less than in opposite circumstances.

Its constitutional effects are in no way so apparent as by its operation upon the salivary glands and gums, yet it must not be overlooked that its action, though less apparent, is still equally destructive upon many other parts of the system. No articles of the materia medica are more uncertain in relation to the specific effects of a given dose, than the mercurials.

Some practitioners have given from 5 to 10 grains of calomel or blue pill daily for weeks without producing salivation. While Dr. W. Phillips in his work on chronic diseases, relates the cases of two females, in one of which a single dose of half a grain, and in the other a quarter of a grain of the blue pill (the mildest possible form) produced severe salivation.

A volume could easily be written upon the general subject we have partially discussed. We will dismiss this subject with a quotation from Dr. Thatcher's practice, (page 214.) who is a strenuous advocate for the mercurial practice in fevers: "Such is the diversity of circumstances in different examples of fever, and so great is the uncertainty of the effects of mercury upon the human system, that no *precise rules for its administration can be given or regarded.*"

The ancients appear to have had some knowledge of antimony. Pliny informs us that it was found in silver ore. It generally contains a portion of arsenic. Basil Valentine first described the mode of extracting it from ore. No metal not

even mercury, has attracted so much the attention of physicians as antimony. One party extolling it as an infallible specific for every disease, while another derided it, as a most virulent poison, which ought to be expunged from the list of medicines. The oxides of antimony are somewhat soluble in water; in this respect, it in a degree resembles the oxide of arsenic in approaching an acid state. Antimony is capable of combining with oxygen, and forming an acid called antimonious acid.—By the addition of cream of tartar to antimony (sometimes called glass of antimony) in boiling water tartarized antimony or tartar emetic is formed. Cream of tartar is composed of potass and tartaric acid, hence the true character of tartar emetic is tartrate of antimony and potass. The taste of tartar emetic is nauseous and caustic. In this form it is made use of in medicine, sometimes by uniting it with some plant possessing emetic properties, as ipecacuanha; at others dissolving it in water, and giving the patient small quantities at a time, as in tablespoonful doses, until the emetic effect is produced. *Why is it an emetic?* In order to show how and why it acts as an emetic, we must again refer to both the chemical properties of antimony, and the chemical constituents of the body. Sulphuric, nitric, and muriatic acids, when thrown into a solution of this salt (tartar emetic) precipitates its cream of tartar. Soda, potass, ammonia and their carbonates, throw down the oxide of antimony. Barytes, strontites and lime (the alkaline earths) not only produce a precipitate of oxide of antimony, like the alkalies, but likewise insoluble tartrates of these earths. The decoction of Peruvian bark and various other plants, which are astringent, or contain the bitter principle, decompose tartar emetic. It is well known to almost every individual that tartar emetic, when rubbed with lard, forms tartar emetic ointment, and when rubbed over the chest forms pustules and eruptions on the skin.

The reason why this effect is produced, is perfectly obvious, it is by its irritating properties, which is produced by its acrid and caustic character, and which it has more effectually acquired by its intermixture with the lard, in consequence of which, it becomes partially decomposed, parting with a portion of its oxygen, and the lard abstracting from the tartar emetic the potass, originally comprising the cream of tartar. We perceive likewise, that there are various articles which decompose tartar emetic, and particularly muriatic acid, which my readers have heretofore perceived, is the most prominent constituent of the gastric juice. Thus when tartarized antimony is taken as an emetic in the stomach, the muriatic acid of the gastric juice, abstracts from it, the potass, and the irritating poisons, oxide of antimony and even antimonial acid is formed, the powerful action of which, on the tender coats of the stomach, is as likely to produce pustules there, as upon the skin. Tartarized antimony, or the oxide of antimony, both being soluble are as capable of being absorbed into the system as mercury, and extending its destructive, irritating and poisonous influence to every organ, which is plainly evinced by its action on the system, in cases where its effects become obvious, which are an austere metallic taste, nausea, copious vomiting, frequent hiccough, burning pain in the stomach, cholic, frequent evacuation from the bowels, fainting, small contracted and accelerated pulse, cold skin, intense heat internally, difficult respiration, loss of sense, convulsive movements, very painful cramps, prostration and death. And where these dreadful effects, do not immediately follow its use, as it is capable of being decomposed by various articles composing the human body, and they in return being capable of being decomposed by tartar emetic; evils of the most serious character follow in their train; even the picromel, the bitter principle in bile, is decomposed by it—the nervous fluid is decomposed

and poisoned by it, and the blood itself. Look at the blue and livid appearance of the skin, the dead and inactive state of it, where this poisonous metallic agent has been used, as in some fevers. That many dyspeptic derangements are produced from this source, there is little doubt. Antimony even when combined with lime, as in the celebrated James' powders, its poisonous effects are not overcome.

Arsenic is an article often resorted to for the cure of disease ; and not unfrequently is it attended with the most serious consequences. Arsenic appears first to be mentioned about the commencement of the Christian era, by Dioscarides. It appears to have been known, both by Aristotle and Thephrastus. It is likewise spoken of by Avicenna in the eleventh century. Paracelsus seems to have been acquainted with it, and Schroeder in his Pharmacopia, published in 1649 describes the process for obtaining it from the ore.

In 1733, Mr. Brandt demonstrated its peculiar nature, and its properties were still further investigated by Macquer, in 1746, by Monnet, in 1773, and by Bergman, in 1777. To the labours of these philosophers, and to those of Mr. Scheele, we are indebted, for almost every thing known, of the properties of this metal. Its combination with oxygen has been carefully examined by Proust, Buchotz, Berzelius, and other chemists.

Arsenic is capable of combining with two proportions of oxygen, and forming two compounds, which possess acid properties, and which have been denominated *arsenious* and *arsenic* acid. The article used in medicine is called *arsenious acid* or *white arsenic*, and is one of the most virulent poisons known. It is soluble both in cold and warm water, in alcohol and in oils. It is likewise soluble in muriatic and nitric acid. It combines with hydrogen, forming arsenured hydrogen gas, having a nauseous smell, extinguishes flame, and destroys animal life. Arsenic combines readily with phosphorus, by pla-

cing them together in water of a moderate degree of heat. Of the deleterious properties of arsenic, we have abundant and most ample testimony, either when given internally or applied externally; a portion of them we shall here transcribe; an austere taste, fetid state of the mouth, frequent ptyalism, continual hawking, constriction of the pharynx and æsophagus, the sensation of the teeth being on an edge, hiccough, nausea, anxiety, frequent sinkings, burning pain near the heart, inflammation of the lips, tongue, palate, throat and gullet, irritable stomach so as not to be able to support the blandest drinks, vomitting of matters, sometimes brown, and at other times bloody, black, horrible fetid stools; pulse small, frequent, concentrated and irregular, occasionally slow and unequal, palpitations, fainting, insatiable thirst, burning heat over the whole body, or a sensation of icy coldness, difficult respiration, cold sweats, scanty, red, and bloody urine; change in the countenance; a livid circle round the eye-lids; swelling and itching of the body; livid spots upon the surface, and occasionally a miliary eruption; prostration of strength; loss of feeling, especially in the feet and hands; loss of sight; delirium; convulsions, falling off of the hair; detachment of the cuticle, &c. It is not often that all these symptoms appear in the same person, but in some instances death takes place without much pain, or prominent symptoms. The appearances after death vary, but they usually exhibit inflammation of the mouth, stomach and intestines; the stomach and duodenum exhibit spots resembling eschars, and perforations of all their coats; and the villous coat of the stomach is in a manner destroyed, and reduced to the consistence of a reddish brown pulp.

From the above effects produced by arsenic, it is not difficult to determine its modus operandi, when we call to mind the action which it must have upon various fluids of the body, when brought into contact with them, it destroys the gastric juice—

it destroys the nervous fluids—it unites with hydrogen and forms a most powerful destructive agent. Add to all this its unsurpassable irritative powers, and the reason why arsenic acts as it does is no longer inexplicable.

We might refer to many other deleterious and pernicious agents, made use of in the treatment of disease, would our present limits permit, as Lunar Caustic or Nitra of Silver, frequently given in the form of pill; Acetate of Lead called Sugar of Lead; Sulphate of Zinc or White Vitriol; Sulphate of Copper or Blue Stone; Oxide of Bismuth &c., as well as to other poisonous preparations, under the denominations of vegetable, as Strychnia prepared from Nux Vomica; Acetate and Sulphate of Morphine, prepared from Opium; Prussic acid prepared either from the prussiate of mercury, or vegetables containing a somewhat similar principle; Cicuta or its extract, which was the plant that destroyed the life of Socrates; Digitalis or Foxglove; Hellebore, Strammonium, Hyoscyamus or Henbane &c.

We will now take some notice of the different treatments which may be called mechanical remedies, which in their character and effects are equally objectionable.

Bleeding has long been practised, even so early as the time of Hippocrates. He bled his patients to excess, sometimes opening two veins at once, and frequently suffering the blood to flow to such an extent as to produce fainting. The practice of modern physicians is not so frequently carried to such an extent as to produce fainting; but the operation is more often repeated. In pleurisy, it is deemed indespensable, but where is the physician that does not know, that in this case a thickening of the pleura is the result, and a chronic disease of that organ invariably follows, which extending to the lungs, terminates in Pulmonary Consumption. In inflammation of the lungs, liver, kidneys, &c., recourse is immediately had to

bleeding. For what purpose? To lessen the inflammatory action of the affected part—to relieve the pain or difficulty of breathing, as the case may be. Does it relieve? Certainly! In many cases it does. How? By lessening the quantity of blood, by which means the force of the circulation is reduced, the vessels become less distended, and the pain thereby mitigated. How long ere the same operation is required to be repeated. But a few hours, and yet it again requires to be repeated. Judge what must be the effect, thus, every few hours drawing such quantities of blood from a healthy and robust person. Would not the system become exhausted? Must not nature sink under it? Is not the whole system which is constantly nourished and supported by the blood, thus deprived of its vitality? In pleurisy there is a determination of the blood to the pleura, a congestion of blood in that organ: is there no other mode of relief but depletion? Can no course be adopted to equalize the circulation? Are there no refrigerants? Can no incitement be produced to a distant part? The manner in which disease is overcome by bleeding, is by debilitating the system so far, as to deprive it of its powers of action. Yet the disease is not thereby cured; it is only changed from an acute to a chronic, fixing itself upon some internal organ as the liver or lungs; and should the patient eventually recover, he owes it to kindness of nature and a good constitution alone. The assertion that bleeding is requisite in consequence of increased accumulation of blood is untenable. Blood can only be produced in proportion to the food we use, and if in a healthy state, must constantly make its deposits throughout the system, and the result that must follow, would be an increase of flesh, and a more robust, athletic and vigorous constitution. Would you not bleed in congestion of the brain, or apoplexy? Not at all! These affections are produced in consequence of the blood becoming

thick, viscid or glutinous; and consequently, does not return from the head by the veins, as fast as it is thrown through the arteries by the heart; hence the accumulation or congestion. The fatal effects of blood-letting are strongly pourtrayed by many judicious authors.

The precise time, and by whom, blisters were first introduced into practice, we are not able to determine. Previous to the discovery of the vesicating power of Spanish flies, various powerful stimulants or escharotics were employed for that purpose. Since the introduction of this article, they have been, and are yet very extensively employed, and their use is strongly recommended in almost every derangement of an abdominal organ, as well as inflammation of the lungs and pleura. Likewise in fevers, and a vast variety of complaints.—Yet there are numerous instances of the evils produced by them. On some constitutions a poisonous impression is made, attended with frequent pulse, dryness of the mouth and faeces, heat of the skin, nervousness and stranguary, and even convulsions: and some physicians have been so much alarmed by the occasional occurrences of these symptoms, as to induce them to employ the remedy with great hesitation. That these affections result from the absorption of the active and irritative principles of cantharides into the circulation, there can be no question. But the above admitted evils are not to be compared with the mischievous consequences too frequently resulting from their use. The human system is at all times more or less impregnated with that morbid matter, which is constantly carried through the system by the circulation, which is capable of engendering disease. Therefore, by placing a blister over any organ, that organ becomes weakened, or so far debilitated as to render it incapable to resist the influence of this morbid matter. Such organ is thereby in a condition not to resist, but to become the convenient receptacle for

whatever train of morbid humours may be forming in the system. How frequently is it the case, where an individual has had a blister placed over the region of the liver; that, upon the occurrence of any slight change of the atmosphere, or, having taken a slight cold, that the first sensation of pain will be experienced in that part. In Pulmonary Consumption, what action can be more conducive to the permanent establishment of that disease, than a blister over the thorax? How long ere an affection of the Lungs would accrue, in that individual most free from it, by placing a blister over the chest.—Like bleeding, urgent symptoms may sometimes be relieved by them: yet it predisposes to permanent injury, by the determination which it creates of the fluids to the blistered part. A little reflection will convince us of its utter uselessness in consumption when we consider the little influence it can possibly have upon the lungs. The lungs hang in the chest; they have no connection with it, and are only attached to the chest by the pulmonary vessels; and to the neck by the windpipe.—Of the evils of blistering, the cases are numerous. Of all the afflictions to which mankind are liable, none are so appalling to the humane and sensitive physician as that produced by burns. Few out of the pale of the profession are aware how frequently, burns apparently trivial and insignificant, are followed by fatal results; preceded in some by symptoms of a decidedly typhoid character, in others, disturbance of the mental functions amounting even to madness, and again, not unfrequently are the symptoms so fallacious as to deceive any but the most experienced in prognosis, in regard to the fatal event. Now, if there be so much danger from inflammation of the capillary nerves, by fire; how can the same effect be free from danger, when produced by blisters? Does not pathology daily prove to us that the cutaneous system is more acutely sensitive than any other organ. To follow nature, to produce a natural de-

termination to the surface of the body, is consistent and proper ; such is the course nature pursues in a state of health.—But who will assert, that an ulcerated and suppurative surface is a healthy action of nature ? Will the advocates of blistering contend that nature frequently produces ulcers on the surface of the body, and so relieves internal affections ? We contend, if the various outlets of the body are not destined to carry off excretions of the body peculiar to their offices, why has nature ordained more than one emunctory ? Would they defend the doctrine by asserting that so long as it be evacuated, it matters not by what emunctory it be done. Is nature's course always beneficial ? This is, when unperverted by unfavorable circumstances, true : but when perverted, does it not pursue a course leading to death ? They would be unwilling to deny this, as it leaves the treatment pursued entirely, and only chargeable with the fatal result. So numerous and so well founded are the objections against blisters, that it is matter of wonder, that they have not been long since exploded.

That the action of cantharides produces inflammation of the bladder by symptoms of stranguary, is universally conceded. Is there any proof of its morbid influence being confined to the bladder ? How does it produce these deleterious effects ? Is it not by absorption ? Why may they not by these means be carried to any other organ ?

Steaming, as practised by some, at least, experience has shown, is not without its evils ; and these sometimes have proved to be of the most serious character even to the destruction of life. It may be said that where such has been the case the operation was performed by those who were unacquainted with the process. We admit them to have been unacquainted with the result, or the effects likely to be produced, had they been so, no excuse could be satisfactory thus to jeopardize life—a patient can be almost as easily steamed or sweated to death, as

bled to death—the process and result is not vastly different. Steaming to a moderate extent, in many cases of acute disease is doubtless very beneficial, particularly vapour baths, but the repeated and inordinate extent to which it is often carried, from the very nature of the case, must produce serious mischief; and even more permanent than that of blood-letting. Where bleeding is had recourse to, the thick or glutinous portion of the blood is discharged from the orifice, as well as the more fluid parts; but in steaming the most fluid parts of the blood are disengaged, whilst the thick viscid or glutinous principle is left behind, or retained in the system; this effect becomes very soon obvious, by almost an entire prostration of the nervous energy. The nerves, like all the other solids of the body, derive their support from the blood; and when the blood thus becomes thick and viscid, it cannot impart, or rather the nerves themselves, cannot receive that supply necessary for their support or nourishment. The idea likewise of steaming in every affection, appears utterly fallacious; some complaints can only be aggravated and promoted by it; and particularly where there is great debility or prostration of strength, which so frequently characterize affections of the lungs, or other chronic disorders. It would appear that there have been instances where the patients have expired under the operation; and although it is alleged that it occured through mismanagement or ignorance, and that regular practitioners are subject to the same mishaps by their mode of treatment, it neither justifies the one nor excuses the other. He who practises medicine, ought at least to know how much his patient can withstand, particularly when it is in his power, every moment of the operation, to increase or decrease its action; the truth is the whole principle is objectionable, and cannot be tolerated by the scientific practical physician.

Issues and Setons.—This practice has been instituted, in order to divert the diseased fluid from an affected part, to an artificial channel; thereby to relieve the system from the oppression and difficulty under which it laboured. The practice is quite common, especially in affections of the lungs. Yet it is impossible to suppose, that any permanent benefit can arise where the morbid matter producing this result, is continually generating and acquiring strength. It may in some instances prolong the life of the patient for a short time; but even that is doubtful, as the facilities granted for the disengagement of this morbid matter, might produce an increased tendency in the system to its generation. Their action is always unpleasant and disagreeable, and frequently produces considerable debility. In fact it is but another drain through which life must continue to ebb.

We need not here refer to emetics, having taken that into consideration upon a previous occasion.

We will yet say a word in regard to Cathartics. They in many instances are rendered of great utility, provided they be of the appropriate character. The bowels are one of the grand excretory organs, to which nature has assigned an obvious duty, and the promotion of a healthy and natural action of the bowels, are therefore, in accordance with her known principles. But let us enquire, how do cathartics act? Various ideas have been entertained in regard to the action of cathartics, but the "specific vital principle," which we have so frequently referred to, has ever stood in the way of its elucidation. There are three ways in which cathartics act: one class of cathartics, as senna, jalap, aloes, gamboge, colycinth, croton oil, &c., act by irritation and stimulation. Castor oil, olive oil, &c., act by lubrication. There are others again, which act by decomposing the morbid contents of the bowels; which thus becoming sufficiently attenuated, are ren-

dered capable of evacuating their contents. Those which act by irritation, produce pain and distress in the bowels, and sickness of the stomach, and may, if their acrid properties are taken up by the absorbing vessels, be carried into the blood, and produce an irritative quality of that fluid, terminating in eruptions, &c. Oils give less pain, and are milder generally in their operation: but no further benefit is experienced, than relieving the bowels when in a state of congestion. Both those that act by lubrication and irritation, leave the bowels more costive or constipated, after their use. Not so with those articles which act by decomposition: they are seldom if ever attended with pain and distress; nor are they attended by subsequent constipation or costiveness, and almost invariably a regular action of the bowels succeeds their use. By the decomposition which they produce of the hard and indurated fœces, or contents of the bowels, a free and full discharge from the alimentary canal is effected, which particularly in costive habits, affords the greatest relief. Again, their operation is of the mildest character, never debilitating the patient unless used to excess, or in very large doses. They are the only kind of cathartics that should be employed in any state or stage of disease.

As our limits will not permit us to pursue our enquiries farther on the present occasion, we shall be obliged to close our little volume, by some desultory remarks on the character and nature of diseases generally. We have seen, that there can be but three direct actions produced upon animal matter, be disease what it may, or where located. That composition and decomposition is necessarily and constantly taking place in the whole animal economy, and that no other than these actions take place, either in decomposition or disease. It is true, that various specific viruses, as small-pox, measles, &c., may be introduced into the system, and thus create disease of

a specific character; yet the direct action is the same—some of them run their course and terminate, but their violence, may always be more or less obviated; others again require particular treatment, in order to neutralize or subdue the specific virus originating the disease; here again is shown, the absolute necessity of a knowledge of the chemical constituents of animal matter—as to contagion,—all diseases are more or less contagious, according to their acrimony, or volatility of the miasma exhaled, and the susceptibility in an individual to receive the infection. Physicians have divided diseases into two classes which they term *acute* and *chronic*. Under the name *acute*, they class all those diseases that are severe and painful, of but short duration, as the various kinds of fevers and inflammations. Under the head of *chronic*, they class all those diseases which are of long duration; sometimes called lingering, as diseases of the liver, lungs, kidneys, dropsies, scrofula, debility, &c.;—where they exhibit little, if any evidence of acute inflammation. The division of diseases into those classes, appears to me arbitrary, and not fully calculated to convey comprehensively, the requisite information. The body is composed of fluids and solids—and as composition progressses, the fluids are constantly forming solids; whilst those solids, are again constantly decomposing, and this decomposed matter is either thrown from the system, by the excretory organs, or absorbed into the venous blood.

Now if the venous blood becomes impure, it may render the arterial blood impure; or the arterial blood may be rendered impure by inhaling deleterious gasses into the lungs; or by a sudden change from heat to cold, inducing irritation and inflammation, or fever which in fact, is but another name for inflammation. Where is the difference whether the inflammation be confined to a certain organ, or to the whole body, as in fever; it is precisely the same specific action. In one case the debility of an

organ may be such as to concentrate the action all to one part; in the other it is diffused through the system. As to the peculiar forms of fever, there is no mystery in it. With diseased lungs there may be fever. Diseased liver is the origin of bilious fever, intermittent fever, fever and ague, remittent fever and yellow fever. Fever may be produced by a sudden check of perspiration, which progressing, assumes a more serious character, by debilitating the nervous system; it is then called typhus, and is that stage near allied to putrefactive fever—scarlet, petechial, and spotted fever, owe their origin, to an acrimonious state of the fluids generally—it is all inflammatory action—and the only available treatment, is to restore to healthy action the excretory organs, and neutralize the virus when existing—Fever (so called,) when properly treated, is never dangerous, and will continue but a few days. If by any of the above means, the arterial blood becomes impure, can it be supposed, that diseased arterial blood, could make healthy dedeposits, to form healthy solids—then as a natural and inevitable consequence, follows a disease of the solids. If the arterial blood was pure, it must make healthy deposits, and of course the solids must remain in a healthy state. Hence it cannot but readily be perceived, that as the solids are a secondary formation, and formed from the arterial blood, that the healthy character of the solids, must depend upon the fluids; all fluids are separated from the blood, and they form the respective conduits, in which they circulate. In answer to the question which the advocates of solidism might here feel disposed to raise—"Does not a solid become immediately affected, or diseased from a blow or other cause?" To which we say, inflammatory action does not take place, until the atmosphere has produced sufficient irritation upon the circulating fluid, and would further deny, that the atmosphere affects the solid, but the solid may become decomposed from the fluid,

acquiring properties, by imbibing oxygen of a character capable of producing this result.

If these views are correct, then is the present doctrine of solidism entertained by the profession, erroneous. The distinction between *acute* and *chronic*, would be rendered far more intelligible, if it simply referred to a disease of the fluids, and a *disease of the solids*—distinguishing fever, inflammation, &c., as diseases of the fluids—the formation of pus, &c., as diseases of the solids. The fluids being first diseased in every instance, it would be an important and valuable acquisition to be able to determine with some precision when a solid became affected.

In the above remarks, I may be considered as advocating the humoral pathology, and as that is not the fashionable doctrine of the day, it must be somewhat *disreputable.* Gentlemen, my object is truth not fancy—I have before said that I should pursue truth, let it come in collision with what it might —I have done so, I shall continue to do so; and if you can disprove one single position which I have taken, it is your duty to do so—you know you cannot—you *dare* not attempt it—you know your defeat would be inevitable.

That disease cannot exist without a cause is obvious: these causes we have in a measure pourtrayed. We have said they were not so numerous as some nosologists contended. We have spoken of the possibility of morbid matter being inhaled or introduced into the system, engendering disease, but the instances of this character are comparatively few. From whence then originates the great multiplicity of disease, which constantly surrounds us? It consists not so much in different diseases, as in the similarity of disease; by far the greatest majority of diseases, in our climate, are of a similar character, and consequently have their origin in one general source.—There are scarcely any two, who have been labouring under

disease for some time, that by conversing together, will not among their various symptoms, discover in many points, a similarity between them. In our climate there is one organ of the body, far more predisposed to disease than any other whatever; scarcely an individual can be found whose symptoms, do not in some way show a greater or less derangement of this organ.

Therefore as most diseases to which we are subjected ordinarily arise from some derangement of some specific organ, let us enquire what organs there are liable to this derangement. In the chest we have the heart and lungs. In the abdomen we have the liver, kidneys and spleen. To these organs, are the nerves, vessels &c. attached, for the pupose of receiving fluids for their nourishment, or carrying therefrom the fluid eliminated either to answer some important purpose in the animal economy, or to throw therefrom that which is of no further utility. In these organs then, must we look for the direct and immediate cause of disease, in the general and ordinary course of natural laws. The symptoms which characterize affections of either of them, are of too obvious a character to mislead that mind which is familiar with the animal economy. We have above spoken of an organ, more predisposed to disease than any other. That organ is the liver; every day's experience proves it, the thousands of cases which I have met within a few years, place this subject beyond all question. Why it is so, we have before shown, as well as many of the symptoms which characterize it. So extensive has been this complaint, within my observation; so universal has it been, that I have at times been almost ready to conclude that all the ordinary chronic diseases had their origin in the liver; or with very few exceptions. From a disease of the liver, the kidneys may become diseased; from a disease of the liver, the lungs may become diseased, likewise the spleen, the heart, stomach,

&c.; and from them again, other organs and fluids as before shown. When an affection of the liver extends its influence to the kidneys, pain is experienced across the small of the back, across the loins, often extending down one or both thighs, difficulty, pain, and often a smarting sensation in passing urine which is milky or high colored, with considerable deposition of a brick-like sediment; the patient will frequently feel a disposition to pass urine, sometimes in small quantities, at other times much more freely. Females are particularly subjected to these affections. Much weakness and distress, fluor albus, relaxation of the ligaments of the womb, called "falling of the womb," and bearing down pains, similar to labour, will be experienced under these scircumstances; sometimes it is attended with bloating of the limbs, and abdomen, and not unfrequently terminating in dropsy.

I am aware that affections of this nature have frequently been denominated "spinal complaints." How gentlemen could have determined them to be such, is most singular; certainly no man conversant with the subject, and who was tenacious of his reputation, would hazard such an avowal; yet by such erroneous conclusions have many patients been tortured by blisters, setons, issues, &c., along the spine of the back, until it has resulted in great debility and weakness, and even curvatures of the spine by relaxation of its ligaments. The spine is composed of twenty-four irregular bones, called vertebra, which are most powerfully defended by strong cartilages and ligaments, both internally and externally; upon the spine the whole body turns.

Diseases of the spine have been confined to young children, some living two, three and four years; the oldest one on record appears to have lived but eight years. But the most remarkable feature in a disease of the spine is, that it is attended with a total paralysis of the lower extremities. The person

having a disease of the spine, is incapable of using the lower limbs.

When a disease of the liver extends itself to the spleen, pain is experienced in the left side, above the hip, sometimes extending up the side, where the spleen comes more immediately in contact with the stomach ; and near the diaphragm. Costiveness is often very troublesome in such cases, and a want of power and energy in the bowels, attended with weakness and debility. The organs of assimilation are much impaired, and although the appetite be most voracious, yet will not the food afford that nourishment to the body it demands.

Of diseases of the heart, we have before spoken.

In order to treat the above diseases correctly, how necessary must it appear to every observer, to any individual, that will give it one moments reflection, that the physician should perfectly comprehend, and understand the chemical constituents of the various fluids circulating in those organs, and every change which under any circumstance, they could be subjected to. How can we tell, what is necessary to be done without this knowledge. How can we tell, what is necessary to administer to destroy a virus raging in the system, which is undermining and destroying the constitution, unless we can tell the character, and nature of that virus. In diseases of the liver, what change, what decomposition of the bile, what new principle it formed, to produce the mischief which exists ? If we cannot tell, how can we, how *dare* we, administer a remedy, when it is impossible to determine the results that may ensue. Too often has this practice been pursued, and the results attending it, have proved the most fatal, as the administration of morphine, strichnine, prussic acid, arsenic &c., but it is hushed up—kept quiet —the administerer of it, had friends in the profession—they say it is all right—it was one of those fatal occurrences, which from the peculiar idiosyncrasy of the case, it was impossible to for-

see ; and thus the ignorant culprit is shielded from just retribution. When at the same time, should a similar occurrence take place, with a poor Botanic Doctor, one who deals in simples, roots and herbs, these ignorant pretenders, would be the first to cry quackery, empiricism, ignorance &c., and hunt him through every channel of the law, supported by their whole popularity and influence, until they could have him indicted, tried for his life, or sent to the State Prison to palliate his offence, and all forsooth because he had not a peculiar parchment, not inaptly termed "a license to kill." In the the above language I by no means wish to be understood to refer to the whole medical profession, there are many of them, that would detest such acts. But my readers are aware that such things have been done, and I mean to apply it to those, and only those, who have or can be guilty of such acts, several who have been guilty of mal-practice, who were regularly licensed, have met their lawful deserts, though it is probable, they may not have been particular favourites.

Diseases of the liver may, and very often do produce diseases of the lungs,—this is by far the most usual form of diseases of the lungs ; although they may exist, independent of a diseased liver. As disease of the lungs, has a long time been considered a disease of so invariable fatal termination ; I shall enter somewhat more into detail, in which I shall not fail to take notice of the usual mode of treatment, now commonly resorted to, it being that, which in my humble opinion, is not even calculated to allay in any degree, the progress of the disease ; far less to be remedial or curative ; but on the other hand, well calculated to aggravate and increase diseased action.

The evidences existing of the curability of Pulmonary Consumption, are numerous. This disease may be said, to occur in two specific forms, one by immediate inflammatory ac-

tion, resulting in the formation of ulcers, evinced by the expectoration of pus, this is the most usual form; the other is produced by the gradual deposition of hard and concrete substances, in the air cells of lungs, before alluded to, which concrete substances, after a while take on inflammation, from the nature of their irritability, and likewise result in ulceration.—This form of the disease is called *tubercular consumption* In the early ages of medical science, little was known respecting the nature of tubercles. Nor was the attention of physicians directed particularly to it, until about the year 1679, when Sylvius de la Boe published a work, in which he gave a tolerable correct account of tubercles, as the cause of consumption; but he attributed their formation to scrofulous derangements of invisible glands, which opinion was adopted by Morton and Wepfer, and some others; and since more particularly by Broussais. From that time to 1733, little more transpired, when Desault of Bordeaux, published an essay, in which he maintained that the sole cause of consumption was the formation of tubercles in the lungs, which in the last century received the sanction of several of the profession. Tubercles have subsequently been investigated by Stark, who examined morbid anatomy with considerable industry; and still more recently by Baillie, Louis, Andril, Lænnic and Carswell. All of which investigations have not settled the principles among physiologists: various opinions continue to be entertained. Among those opinions perhaps there is none deserving more attention than that of Dr. Carswell—his researches were minute and careful. He considers that the surfaces of the mucous and serous tissues and the blood form the exclusive *seat* of tuberculous matter—he observes, "in whatever organ the formation of tuberculous matter takes place, the mucous system, if constituting a part of that organ, is in general either the exclusive seat of this morbid product, or it is far more extensively affected with it than any of the

other systems, or tissues of the same organ." Dr. Clark, Physician to Queen Victoria, in his late treatise on Pulmonary Consumption, makes the following observations on the subject of tuberculous matter,—" In general, tuberculous matter, first makes its appearance in the lungs, in the form of grey semi-transparent granulations, gradually takes on the characters of crude tubercles, and ultimately becomes softened. During the process of softening and ulceration, tuberculous matter continues to be deposited in other portions of the lungs, the proofs being generally from above downwards,—so that we often find excavations at the summit, crude or softened tubercles below these, and granulations, with no trace of opaque matter in the lower part. At a late period of the disease, the substance of the lung is often so filled with tuberculous matter, as to leave but few traces of its original structure, the whole constituting a mass of dull opaque, grey or white tubercular infiltrations, excavated to a greater or less extent."

Of the curability of pulmonary consumption, opinions are most various. The most prevalent and general belief is, that it is incurable ; especially after the lungs have become tuberculated, or ulcers are formed. This belief could have had its origin in no other source, than the very limited success, which has attended the usual course of treatment. It is generally supposed by all classes of community, that, when the lungs have once become ulcerated ; that no principle or mode of treatment, could prove available ; — and that no remedial agent could be successfully applied. And consequently, all hopes are abandoned by the friends of the patient so soon as those prominent symptoms make their appearance. That in such cases, all hopes should be abandoned, and all efforts for recovery cease, certainly cannot be determined with propriety from the very fact that in numerous cases where the lungs

have been deeply ulcerated, by judicious treatment, a perfect restoration to health has followed. The question, however, is frequently raised, — "how can any medicine reach the lungs?" It is not impossible! Again, how is it possible for healthy granulations to take place, when the lungs are constantly in motion, and this action being indispensible with life? must not this constant friction or chafing in the lungs keep up the irritability and inflammatory action? And is there not still a much greater difficulty? Is not the purulent matter effused from an ulcer in the lungs constantly in contact with the atmosphere? Does not the oxygen of the atmosphere constantly unite with the purulent matter, forming a poisonous ichor which extends itself to the edges of the ulcer, and induce it to spread wider. Does not the constant action and moisture of the lungs prevent the formation of any scab, or indurated matter, so as to protect an ulcer, from the action of the atmosphere? External ulcers form incrustations, by which they are protected from the action of the atmosphere, and are thus induced to heal; but upon the lungs such formations are impossible.

These arguments against the curability of consumption, formidable as they may appear, are not sufficient to establish the case, that the disease is absolutely incurable, for the very best of all reasons, because facts in abundance exist, in proof of its being permanently cured where deep ulceration of the lungs had existed. Dissections have even proved that life has been maintained, when not over one twentieth part of the lungs, were capable of performing their functions. A delineation of these evidences of the curability of consumption, would be far more numerous than is generally supposed. Dr. Clark states, "that Pulmonary Consumption admits of a cure, is no longer a matter of doubt; it has been clearly demonstrated by the researches of Lænnic and other modern pathologists."

Dr. Carswell's language upon the subject is equally strong: he says "Pathological Anatomy has perhaps, never afforded more conclusive evidence, in proof of the curability of a disease, than it has in that of tuberculous phthisis." He likewise gives the appearance of the lung after having been cured of a tuberculous disease, "the tuberculous matter whether contained in a bronchial tube, the air cells, or cellular tissue of the lungs, has assumed a dry, putty looking, chalky or cretacious character." That Pulmonary Consumption has been cured in numerous instances, we have so many well attested facts, that it ought to silence the constant clamour, of its being an incurable disease; the facts of cures having absolutely been performed, should awaken enquiry and investigation; it should cause the most arduous and indefatigable research, to acquire a knowledge so important to mankind. But the reverse of this seems to be the prevailing disposition—the universal cry is—it cannot be done—it is folly to attempt it—and if a case presents itself, where the evidence is clear and decided, that ulcerated lungs have been cured, it is regarded as a singular, unaccountable, unusual, incomprehensible, and extraordinary occurrence; it is looked upon as doubtful and uncertain.

This disposition, has led to the rejection of every measure proposed for its treatment: it is even treated with contempt by those, whose ignorance, pride and folly, have led them to believe, they were possessed of science and knowledge, beyond that of their contemporaries. But we will record facts, and from them, let those who can dare, and will reason, judge. "In the Military Hospital at Capua, where the greatest number of Consumptive patients of the army are sent, the most recent and extensive experiments were made by Dr. Giovanni de Vittis, Physician to the Military Hospitals of the Neapolitan Army; and from the 1st of May, 1828, to the 8th of January, 1832, there were sent out of the Hospital perfectly cured, forty

cases of Chronic Catarrh, forty seven of Consumption in the first stage, one hundred and two in the second, and twenty seven in the third, making a total of two hundred and sixteen cases, one hundred and seventy six of which, were cases of Consumption." Dr. Magennis, of the Royal Hospital at Plymouth, in England, reports "that of seventy two cases of consumption, twenty five with ulcerated lungs recovered, and fifteen from the stage previous to ulceration. Thirteen, in an early stage of ulceration, were discharged, grately relieved, nine in the previous stage, and but ten cases entirely lost."

The above are reports made by those physicians, to their respective governments; are they to be considered false? are they to be charged with base and unprincipled deception? will not their characters, their hard earned reputation, screen them, from such unprincipled imputation? What interest could they have in an attempt to deceive, and foist upon their governments a report destitute of truth? And had such statements been untrue, how long ere their falsity, would have been detected, and their disgrace so permanently established, which nothing could obliterate? Besides were there not the living witnesses to testify to this result?

We might greatly multiply evidence of this character. Medical records are full of them. Dr. Beddoes states that he cured three cases out of five, of tuberculous consumption in his practice. Would it not be deemed ostentatious in me, I could illustrate many cases of this disease, within the last four years, many of them of the severest character, and far advanced in ulceration, which by my treatment have been perfectly restored, and now live in the enjoyment of health: there are even some who live in possession of comparative good health, with the entire loss of one lung. These declarations may appear strange and even questioned by some; but the question is easily settled. Those individuals stand ready to be subject-

ed to the most scrupulous examination which the art of chirurgery can premise ; some of whom have already passed through the ordeal. I have not said, nor do I say that *all* can be cured. To determine positively when a disease can be cured, or cannot be cured, is utterly impossible. Many cases apparently within the controul of remedial agents may prove mortal, whilst others again, which bear the strongest marks of the advanced stage of disease, yield readily to appropriate treatment. The former exhibits the existence of deep seated ulcers, the latter open ulcers, or located near the surface.

The treatment of this disease requires a due consideration of its nature, whether it be originally produced by the deposition of tuberculous matter in the lungs, or by the formation of simple ulcers, by inflammation. If the former, the nature and properties of these tuberculous deposits in the lungs, must be understood. These tuberculous deposits are from the blood, and are of a specific character, the blood being surcharged with this matter, or cheesy substance, deposits them in the air-cells of the lungs. Then must this morbid constituent of the blood, be decomposed by the use or application of such agent, which uniting with the tuberculous matter, will render it fluid ; it may then be carried from the system by the excretory organs. But if ulceration has already taken place, or the disease is of the character produced by inflammatory action, treatment of a different character is required.

We are aware that for a long series of years, but one principle, upon a general scale, has been pursued for the treatment of this disease, although the daily illustrations of which, prove beyond all equivocation, that it is not only unavailable, but in many instances very injudicious, and even deleterious.

When there exists but slight symptoms of a disposition to disease of the lungs the almost invariably first application is a blister accross the chest. The propriety of this practice to

say the least is extremely dubious. But it is a practice which has been strongly recommended and advocated by the most distinguished medical writers, philosophers and practitioners for a long period of time. I am aware that in opposing it I have a mighty phalanx to contend against. Notwithstanding the influence which may exist in its favour, and as popular as the doctrine of blistering may be (especially in this disease) I cannot from a due consideration of its nature and effects, but raise my hands against blistering the breast, especially where there exists the slightest disposition to a disease of the lungs. The doctrine of sympathy, one of those convenient chimerical fancies which had its origin in the vital principle, has led to the practice of blistering. It has been alleged that there existed great sympathy between the lungs and the skin ; and that a blister across the chest was calculated to divert the disease from the lungs to the skin. This doctrine of sympathy between the skin and lungs, has received no further illustration of its existence by learned medical philosophers — "than it is so." How, why, or by what vessels or organs it is conveyed, science nor observation has never acquainted us with.

The impropriety of blistering the chest in Pulmonary Consumption will be more fully comprehended when we take a view of the situation of the lungs. The lungs are two vital organs situated in the chest, by means of which we breathe.— The lung in the right cavity of the chest is divided into three lobes ; that in the left cavity into two. They *hang* in the chest—*not attached to it*—they are attached at their superior part to the neck by means of the windpipe, and are separated from each other by what is termed the *mediastinum*, or middle, which is formed by the folds of the pleura, the membrane which surrounds the lungs, and divides the chest into two parts. The lungs are likewise attached to the heart by means of the pulmonary vessels, which consist of the pulmonary ar-

tery, which carries the blood from the right ventricle of the heart to the lungs, and the four pulmonary veins which re-convey the blood back from the lungs to the left auricle of the heart. The lungs contain but few nerves of sensation ; they are from what is called the eighth pair ; so little sensibility do the lungs possess that the patient seldom feels much pain in them when seriously diseased. He cannot tell when they are ulcearted, and often is the most critical examination by the stethescope, unavailing in discovering the extent of diseased action upon the lungs. The pains experienced across the chest are not in the lungs, but are produced by the blood passing through the blood vessels, traversing near the surface of the chest. The lungs are however freely supplied with organic nerves from branches of the great sympathetic.

Here is perceived the situation of the lungs. There is no direct connection between the surface of the chest and lungs whatever; they are not attached to the chest, they hang in it, and are there surrounded by a membrane called the pleura, it has no connection with the chest—they may be compared to a bellows, constantly expanding and contracting. The very blood that circulates in the lungs, has to return from them to the heart, and then to be thrown by the heart through the arteries and enter the capillary vessels of the skin, before there can be a more immediate contact between the lungs and skin; and the blood of the capillaries does not immediately return to the lungs. There is no possible way whatever, for any immediate connection to exist between the skin and lungs, and in no other way does it, but through the agency of the blood, as just shown. There is yet another difficulty to surmount in blistering the chest.—Between the lungs and the surface of the chest is interposed the sternum.—Do gentlemen, really believe, that a blister, when the lungs are thus situated, can draw the disease from the lungs through the breast bone ?—if

so, their folly must be greater than we supposed; but the constant practice of blistering would go far in support of this opinion. But will it be denied, that blisters ever afford relief? they sometimes do, but more frequently do not. Well, how do they afford relief? A blister placed across the chest, or any other part is capable, and does create painful irritation, inflammation and suppuration,—and if kept up for some time, as is usually the case, the free discharges from it weakens the part, and creates a tendency of the fluids from all parts of the body, to concentrate themselves there, which by the decomposition then taking place in such particular blistered part, much of the virus supporting the disease may be carried off, and the patient thus relieved—the same effect would be produced by bleeding—powerful cathartics, &c. But does this view of the subject argue the propriety of blistering, especially over the chest. Suppose it were to have been carried so far as to completely relieve the patient of the disease, is it conclusive evidence that the practice was unobjectionable? As the object of the blister is to deplete from the lungs,—we would ask can a blister across the chest deplete directly from the lungs—the answer is no—it is impossible—it is contrary to reason, anatomy and common sense. But this is not the only difficulty. When the lungs have become debilitated from any cause, do we not further embarrass their actions, by restricting their movements in respiration, which the patient would necessarily do to avoid the pain consequent upon motion of a vesicated surface? To breathe at all under these circumstances demands an effort, as the muscles under a blister are in a measure deprived of the power of contraction.

Another important point is likewise necessary to be considered. Is not, as above suggested, the part over which a blister is placed, debilitated by its action? What then is the consequence, if weakened? Is it placed in a condition to re-

sist the influence of disease ? On the contrary, by the debility thus induced, it becomes less able, and hence such part may become the location and rendezvous of every train of morbid humours, which may be flowing through the system. Which action is more frequently the result than that of a beneficial character. Thus it is that many cases of incipient consumption are rendered permanent by this injudicious method, by the concentration of morbid or diseased matter in the neighborhood of the lungs, which by extending its influence to the internal portion of the chest, permanently establish a disease of the lungs--and bronchia. Where is the medical man that *dare*, whilst in the enjoyment of health, place a blister across the chest, and keep it open for weeks, as he would do upon a consumptive patient ; and yet will he attempt to cure a disease by the same means which his own common sense would convince him would be attended with great danger in a healthy person. We have yet another important argument against the propriety of blisters. We have referred to cases, where a disease of the lungs may be produced in consequence of a primary disease of the liver. If at that time, or at that point, when the disease of the liver began to transfer its action to the lungs, which might be marked with slight pains across the chest and in the left side, attended with some cough, and a disposition to easily take cold, a blister be applied across the chest, would it not materially aid in much more rapidly transferring the disease from the liver to the lungs. If blisters must be applied at all, why not transfer them to a part which cannot interfere with the transactions of the diseased organ.

Another mode of treatment, is by rubbing the chest with tartar emetic ointment, for the purpose of forming pustules or eruptions upon the skin. The same argument equally applies here, as it respects producing a determination from the lungs to the skin, as it does in blisters, and the general difficulties may be

increased by the absorption of Antimony into the system, producing antimonial action as before referred to.

Expectorants are likewise a general resort, and are sometimes carried so far as to act as emetics. Their use in some cases may be of some utility, but their extensive use are by no means proper or judicious. By expectorants which nauseate, mucous may be thrown with greater ease from the lungs and wind pipe when accumulations take place there, but if persevered in beyond this point, their action may increase the disease by increasing the discharge from the lungs, and thus open a channel through the lungs for every morbid humour, which, flowing through the system, may be thus irritating and increasing diseased action of the lungs. In ulcerated lungs, it would prove extremely injurious, by inducing the purulent matter from the lung to its surface, where it would have the tendency of enlarging such ulcer. Consider a case somewhat similar Suppose an individual labouring under violent diarrhoea, the bowels irritated and inflamed; who in such case would think of resorting to drastic cathartics to effect a cure. Yet here is a case precisely similar in character, in which emetic expectorants are to be employed, they can serve no other purpose than to induce the ulcer to become larger. It is extremely doubtful whether such expectorants migh not altogether be dismissed from the practice of medicine with advantage. The mucous effused from the lungs upon their surface, is always possessed of sufficiently irritative properties to excite the action of the lungs to cough, which by colapsing, the lungs discharges the mucous, and such expectorant can only act by increasing this irritability. But it is a matter of no little importance, to have some correct views, how it is that expectorants so called act —how they produce their effects. Authors have manifested considerable reserve on this point, many of them not caring to refer to them at all; and none venturing to advance any specific

opinion, how the effect which they produce is brought about. It is well known, that nothing can be introduced into the lungs except inhaled in the form of gas, and that but in small quantities.

The expectorant is received into the stomach, which from thence must pass into the intestines, and from thence must be taken up by the absorbents, and thence pass through the thoracic duct into the venous blood, and thence to the heart, and be thrown to the lungs before it could come in direct contact with the lungs. This is a long way for the expectorant to reach the lungs, and in its passage *there*, must meet with various changes by coming in contact with other agents. But it is said, it acts by sympathy. What kind of sympathy? Will gentlemen inform us? Will sympathy of the stomach attenuate viscid mucous in the lungs? Remember the stomach is situated in the abdomen, the lungs are in the thorax. They are separated by the diaphragm. The attachments of the lungs are not to the stomach; they have no connection but with the windpipe and heart. Now, sirs, will you tell us how expectorants act, or will you be satisfied to erase the name from the materia medica, and replace it with one more appropriate. But will not the inhalations of some gaseous substances attenuate the viscid mucous in the lungs? It may; and it is the only way in which an expectorant so called *can directly* act!—Why does an emetic, or articles which nauseate the stomach favour the discharge of mucous from the lungs?—by excitement, which it not only produces upon the stomach, but upon the heart, and every other organ of the body—upon the same principle by which it produces perspiration from the skin by increasing the arterial circulation, or when (as is sometimes the case) it passes the pylorus and acts upon the bowels.—Then *how do* expectorants act? by attenuation. We have before shown that this mucous was a constituent of the blood,

and when such articles are carried into the blood, as are capable of decomposing mucous, but in a limited degree the mucous becomes thinner, and is consequently separated from the blood in the lungs more freely, and in greater quantities, furnishing often important relief, which is called free expectoration.

Low diet is another course often recommended in diseases of the lungs. This has the same general effect as the other depletive agents we have spoken of—just in proportion as we deprive the stomach of food, just so do we deprive the whole system of support, and in the like manner do we deprive it of strength. It is but another course to exhaust and wear out the system, and hasten the disease to a fatal termination. It is really to me sometimes a matter of surprise, how life is maintained as long as it is. A person is sick—bleed him, and weaken him—give him emetics to weaken him—give him violent cathartics to weaken him—give him active sudorifics to weaken him—give him calomel to salivate him, and thus weaken him—leech and cup him, to weaken him—diet him, give him but the weakest kind of nutriment, and that in quantities hardly sufficient to sustain life,—and all this time the disease is actively preying upon him, to debilitate him still more ; and under these circumstances, gentlemen wonder why he don't get well—it is rather a wonder that he ever should get well; nor would he, unless he had a more than ordinary constitution,—he is surrounded by enemies, without a friend, but his own constitution, and that too must often yield.

By the foregoing remarks, it will be perceived that I almost in every particular oppose the usual treatment in Pulmonary Consumption, but yet contend that ordinarily, it is not an incurable disease. The indications of cure are plainly pourtrayed in the very character of the disease itself—the symptoms which it presents—the whole appearance of the patient show,

in what the derangement consists, and equally indicate the principles of cure. I am willing that those who contend for its incurability should avail themselves of all the benefits which the most disadvantageous circumstances, in regard to it can afford them ; and yet it is not incurable. I admit that no medicine can reach the lungs ; that the purulent matter effused in an ulcer, unites with the oxygen of the atmosphere, and not only prevents the ulcer from healing, but contributes to spread it wider ; and that human life must cease to exist the instant the lungs be deprived of this vital air ; yet is it curable, but not by the usual means.

In diseases of the lungs the body is emaciated—the whole surface of the body, the skin, appears from its paleness, as if there was very little if any blood charging the capillaries, the patient experiencing sensations of chilliness, unless it be during the hectic exacerbation, attended with rapid emaciation, and loss of strength. What in reality is the true nature of the case under these circumstances ? At every pulsation of the heart the blood is thrown to the lungs ; but the lungs having become debilitated, are thus rendered incapable of returning the blood from them back again to the heart as fast as the heart throws it to them. The same result might likewise be produced by a thick and viscid state of the blood. The consequence of this would be that accumulations of blood would take place in the lungs ; the blood-vessels of the lungs would become filled, charged, and gorged with blood ; this would induce the lungs to enlarge or swell, giving rise to shortness of breath, or difficulty of breathing. In this situation any slight occurrence, as coughing or sudden exertion, might rupture some of the blood-vessels of the lungs, and blood be discharged from the lungs, called bleeding of the lungs, which would readily be known by its florid, red colour. This accumulation of blood in the lungs by so greatly distending their blood ves-

sels, would produce irritation, which irritation would generate cough, and this cough and irritation would soon effect ulceration, which ulcer would be continually fed or supplied by the constant accumulation of blood in the lungs.

We now have a correct view of the true circumstances of the case, the true state and condition of the lungs in this specific form of the disease. With these facts before us, we become enabled to exercise our reasoning faculties ; to form ideas of the principles of cure proper to be adopted ; to weigh those principles, examine them, and criticise their action in all their bearings, and are thus most capable of adopting such a course as would be most likely to promise success. Then the enquiry arises,—Is blistering the chest a correct practice ? We think and reflect upon the action of a blister : it may weaken the part—it may induce greater diseased fluids to the parts, and thus increase the already existing difficulties. Besides the irritating properties of cantharides may be absorbed and increase the irritability. What advantage shall I derive from blood-letting ? I may for a short while relieve in a measure the congestion, but no longer than is sufficient for an increase of blood to again charge the lungs ; then will bleeding be required again. But shall I not by such action much further debilitate my patient ? Shall I not deprive the system of its natural and requisite support ? And what benefit can I expect to derive in regard to the ulcer ? What benefit may I expect to derive from issues or setons ? May I not by their means direct the action from the lungs, and thus discharge that virus through another channel instead of the lungs ? Does this not appear reasonable ? But it must be remembered this morbid matter is constantly forming ; and although another drain other than the lungs be opened for the discharge of this morbid matter, yet it does not direct the blood from the lungs, nor can it materially lessen the effusion of matter in the ulcer.

May I not derive benefit from expectorants? To give articles capable of acting as expectorants, as they are generally supposed to act, is to increase the discharge from the ulcer upon the lungs already too great; as every portion of matter induced from the lungs into the ulcer, unites with the oxygen of the atmosphere, which renders it of a poisonous, irritative character; and by poisoning the edges of the ulcer, it causes it to spread wider, and thus the very evil designed to be overcome is augmented.

Is there then any course that can with propriety be adopted, that would promise a favourable result, or even a mitigation of the disease. There is. We have already referred to the situation of the patient; the blood having left the surface of the body, and charging the lungs: can we not induce that blood to quit the lungs, and return, and again circulate as usual in its natural channels, the capillaries of the skin, by the application of such means as shall produce a constant determination to the surface. It may be said, is not that the object of blisters? If it be the object, the result is of a far different character. I do not mean to a certain part, but to all parts of the surface of the body; not by vesication, or producing pustules and thus weakening or debilitating the part, but by a process free from the evils unavoidable in blistering. Will not sudorifics accomplish it; sudorifics are valuable, if not carried so far as to exhaust the energies of the system. The effects of sudorifics or steaming would be, that during their operation, the blood would be induced from the lungs to the surface, and the patient for the time being, would experience much relief, but the instant their effects ceased, a revulsion of blood would take place from the skin to the lungs, by which the difficulties of the lungs would be increased beyond that which existed previously. Such course must be adopted, as to permanently relieve the lungs; the blood must be induced

from the lungs to the surface of the body, and retained there—not for a few hours, but for days, weeks, and months if required, and until the lungs shall have acquired sufficient strength to return the blood from them to the heart, as fast as the heart throws it to them; this cannot be done by blisters, issues, setons, bleeding, steaming, emetics, expectorants or sudorifics. Gentlemen will ever find Pulmonary Consumption incurable, so long as they refuse to adopt this principle, and produce this effect. What then must be the result of this treatment? Must not the lungs become relieved of the accumulations of blood in them? Must they not become relaxed; relieved from their burden, and will they not then contract to their original size, and will not then the difficulty of breathing and shortness of breath be obviated? When the blood vessels of the lungs are no longer distended or strained, will there be that irritation there; and if the irritation has subsided, will not the cough likewise cease?

It may be said, that all this is very well and may greatly relieve and benefit the patient, but you do not effect a cure; the ulcer upon the lungs yet remains, which according to your own illustration, cannot be cured, first, because no medicine can reach the lungs, and secondly, in consequence of the purulent matter uniting with the oxygen of the atmosphere, of which we cannot be deprived and live, by which means the ulcer is constantly aggravated and enlarged, and must necessarily progress to a fatal termination. Not quite so fast good sirs! Was it not the accumulation of blood in the lungs, by which the ulcer was supported? The lungs are now free from this accumulation, and the ulcer is deprived of support, in familiar language, starved. Our object, you perceive, is not to promote effusions upon the lung, in the site of the ulcer; but that which is directly the contrary, absorption from the *ulcer* into the *lung*, and from the *lung* into the *system.* The consequence of

which is, the ulcer upon the lung becomes smaller and smaller every day, until the expectoration of pus ceases, the ulcer closed, and the patient cured. But you absorb the diseased matter into the system,—what will you do with it then? Neutralize it, render it incapable of doing further mischief, carry it from the system by the various excretory organs.

We will yet add a few remarks in regard to mineral and vegetable agents, in the treatment of disease. We are aware, that, those who use vegetable remedies alone, and contend earnestly for their exclusive use, are looked upon by the great portion of the community, with an eye of indifference at least, but often are they singled out as men destitute of the knowledge of Anatomy, possessed but of a small share of education and but little knowledge of the science of medicine. This can only be attributed to a want of knowledge or to a prejudice, having its origin in the influence, which interested individuals have been enabled to exert over their credulity. The only test must be a trial of their relative qualifications. That point is now at issue, and is now rapidly approaching its conclusion. How it must terminate, needs no particular foresight to evince. The thousands and tens of thousands, in all sections of the United States, who have within a few years, and those who are now daily abandoning the use of mineral agents for the treatment of disease, speak a language which cannot be misunderstood. The ultimate issue is no longer involved in doubt, a change, a thorough change, will soon take place in medicine.

Physicians will have to start their studies from a new point, practice upon different principles, and adopt very different remedies from what they are now using. A few years from this time, and the mineral and depletive practice will be held in contempt, by every well informed mind. The people themselves will take this great and important cause in hand—they begin to perceive that the health and well-being of both them-

selves and families, demand it; posterity demands it, and they will not suffer the important obligation under which they feel themselves placed, to pass by unheeded. Already have they it in agitation, to establish societies among themselves for the furtherance and support of the Botanical cause, and for the suppression of the mineral practice. We bid them good speed, and shall not hesitate to throw all the force and energy of which we have controul into the scale. It is a good work—a worthy undertaking, and one calculated to immortalize its projectors.

That vegetable remedies, and they alone, were designed for the treatment of all the diseases of mankind, is perfectly obvious and clear, from their very nature, and from all evidence which can be brought to bear upon the point. Is not our whole system formed from vegetable matter, vegetable productions alone. If so, does it not follow as an indisputable fact, that minerals are incompatible with the human constitution? Are there not medicinal plants? If there are, for what other purpose were they formed than for medicinal agents? Were they not the first agents ever resorted to by the ancients, and were they not most eminently successful in the treatment of diseases by them? Minerals are the last grade of matter, and consequently capable of decomposing all the primary grades. Of the specific action of some of them, we have herein portrayed. Minerals are poisonous to vegetable matter, as well as animal. Place a plant in a bed of calomel, arsenic or antimony, and see if it will grow. Both the laws of nature and our own common sense and experience, prove to us that minerals are incompatible, and of course destructive to the human constitution. Even the dumb brute who is only governed by instinct, evinces a stronger and more correct judgment in this respect; the dog will seek the chamomile, the toad the plantain, the cat the catnep. Shall we who boast of reason, fall beneath the

animal in respect to this important matter. Reason and common sense forbid it.

It is true, that there have not been those efforts made use of to discover the various medicinal properties in plants which the importance and absolute necessity of the case require. The reason why such efforts have not been made since the lights of Chemistry have been developed, is because mineral agents have held the ascendancy. Medical philosophers have directed their enquiries to the discoveries of minerals and their various combinations, regarding vegetables as unfashionble, or beneath their notice. Why they have done so; why they have neglected both Vegetable and Animal Chemistry, is equally apparent they would not have done so, had not their minds been continually warped and biassed by this "*specific vital principle*," by which they were firmly of the conviction that the *modus operandi* of medicines, could never be understood: always referring the power by which a medicine performed its effects to an agent beyond the reach of human understanding. Had they abandoned this chimerical principle, studied the Laws of Nature, and become acquainted with them; long ere this, would minerals have ceased to have a place in the materia medica.

The time, however, has arrived when this important study must commence. It can no longer be suffered to remain in obscurity, unintelligible to mankind. The day is not far distant when Schools and Colleges will be established; the express object of which will be to teach Natural Philosophy in all its various departments, and Medical Science, Chemistry, Botany and Anatomy upon their true principles. Medical men will then arise whose science, whose knowledge, whose correct prognosis in disease, and application of medicinal agents, will be of a character so far superior to the quackery and empiricism of the present day, that the thousands of nostrums that now inundate our land, will no longer maintain a footing or a name.

A most important point to be acquired in the treatment of disease by vegetable remedies, is, how properly to prepare their product for use—that is to know what particular article there is in a vegetable which we require—how to extract it from the plant, to obtain the pure medicinal virtures of the plant, free from all the extraneous matter or substances which it may contain, other than required. Some plants impart their virtues to alcohol, some to ethers, some to acids, some to oils, &c. some impart their virtues to boiling water, others again the instant boiling water is placed upon them their virtues are gone, some are obtained by distillation, others by spontaneous evaporation &c. We here close our remarks, and shall only add, that our Philosophy of Practice is founded on the Laws of Nature;—Our Theory of Disease—the Theory of Experience and Evidence;—Our Materia Medica—the *Boundless Forest!*

I have writen this work, under the most disadvantageous circumstances, having been compelled to attend to other duties all the time, in which I have been engaged in it. Seldom could my mind be devoted to it, but for a short period at a time, sometimes not more than ten or fifteen minutes, before my attention was required to consult with some patient. I have had no opportunity of revising, it having been printed as fast as written. From which circumstances it must necessarily contain inaccuracies, typhographical, literary and grammatical, and I may have repeated in some instances the same idea, not having examined the sheets since it came from the press. I however think I have so expressed my ideas as to be understood. Should they meet the approbation of that public, whom I am happy to serve, they shall soon hear from me in a more elaborate form, in which I shall enter minutely into the symptoms, character and nature of diseases, and their appropriate remedies. The circumstances under which they should be used; and why they should. Giving in all instances cause and effect.

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